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INCORPORATED

LIFE SCIENCES DIVISION

FINAL REPORT

SUPPLEMENT 1 - PRODUCTION GUIDES

1 October 1968 to 31 January 1973

Contract NAS9-8927

FLIGHT FEEDING SYSTEMS DESIGN AND EVALUATION

National Aeronautics and Space Administration
Manned Spacecraft Center
Houston, Texas 77058

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FINAL REPORT

SUPPLEMENT 1 - PRODUCTION GUIDES

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CONTRACT NAS 9-8927

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS 77058

PRODUCTION GUIDES - APOLLO FOOD SYSTEM

T.I. No.	Title
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002	Instant Orange Juice
003	Mobile Quarantine Facility Food Procurement
003-A	Apollo Preflight and Postflight Food Procurement
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PRODUCTION GUIDE FOR CHICKEN AND RICE SOUP

CHICKEN AND RICE SOUP

1.0 Scope

1.1 This document describes the requirements for the processing, packaging, testing and shipment of freeze-dried chicken and rice soup for use in aerospace feeding systems.

2.0 Applicable Documents

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

U. S. Department of Agriculture

Regulations Governing the Meat Inspection of Poultry and Edible Products Thereof and United States Specifications of Classes, Standards and Grades with Respect Thereto.

3.0 Requirements

3.1 Materials

The products shall be manufactured from components which comply with the regulations of the Food and Drug Administration, U. S. Department of Health, Education and Welfare or regulations of the Consumer Marketing Service, U. S. Department of Agriculture. All materials shall be of edible grade, clean, sound, wholesome, and shall be free from evidence of insect infestation or objectionable foreign matter, odors and flavors. Material shall be in excellent condition at the time of use.

3.1.1 Chicken

U. S. Grade B or better roasters, fryers or broilers shall be used.

3.1.2 Salt

Salt shall be non-iodized sodium chloride.

3.1.3 Rice

Fully cooked freeze-dried parboiled white rice shall be used.

3.1.4 Starch

Modified and pure unmodified waxy maize starch shall be used.

3.1.5 Chicken Stock

Chicken stock shall be fat free and shall be used within 24 hours after processing.

3.1.6 Pepper

High quality ground white pepper shall be used.

3.1.7 Seasoning

Thyme and celery leaves shall be used as seasoning ingredients.

3.1.8 Chicken Bouillon Cubes

High quality chicken bouillon cubes shall be used.

3.1.9 Parsley

Dehydrated parsley shall be used.

3.1.10 Formula

The following formula shall be used:

Item	Percent by Weight
Chicken Stock	64.16
Chicken, cooked, diced	18.87
Water	7.13
Rice	5.03

Item	Percent by Weight
Bouillon Cubes, chicken	1.13
Salt	.63
Starch (Polar Gel I)	1.94
Starch (Amaizo 838)	.97
Parsley	.09
Pepper	.05

3.2 Processing

3.2.1 Chicken

The chicken shall be cooked in water for 2 hours. The cooked meat shall be drained and cooled in a refrigerator. After cooling, the Pectoralis major and Pectoralis minor muscles shall be removed and diced into cubes (approximately 1/2 inch).

3.2.2 Chicken Stock

When the cooked chicken is removed from the stock, the stock* shall be placed in a refrigerator and cooled. The fat layer shall be removed from the chicken stock after separation of the two phases. Salt, pepper and bouillon cubes shall be added to the stock. Fresh celery leaves (approximately 10 percent of the total soup mixture) and thyme (approximately .04 percent of the total soup mixture), wrapped in cheese cloth, shall be placed in the stock which is then simmered for 20-25 minutes.

* The stock is prepared by cooking a chicken in about 2 1/2 cups of water.

3.2.3 Starch

Starch is added to the water and a smooth paste is formed. Approximately 1/4 of the hot stock is added to the starch paste. The ingredients shall be blended well by stirring. The starch paste is added to the remainder of the hot liquid and the mixture is cooked until it thickens.

3.2.4 Mixing

The diced chicken, rice and parsley shall be added to the mixture and the soup shall be heated to a temperature of 212°F. for 10 minutes.

3.2.5 Freezing

The product shall be frozen immediately after heat processing.

3.2.6 Freeze Dehydration

The product shall be freeze dehydrated. The platen temperature shall be 125°F. After drying, the vacuum shall be broken with nitrogen and the product shall be packaged immediately.

3.3 Finished Product

3.3.1 Physical Requirements

The finished product shall be free of any foreign material and there shall be no evidence of incomplete rehydration, such as soggy areas. The moisture content of the finished product shall not exceed 2.0 $\pm$ 1 percent. When the finished product is rehydrated, there shall be no off- flavors or odors.

3.3.2 Microbiological Requirements

The microbiological composition shall comply with Addendum No. 1E, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

3.3.3 Deliveries

All deliveries shall conform in every respect to the provisions of the Federal Food, Drug, and Cosmetic Act and Regulations Promulgated Thereunder.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor is responsible for the performance of inspection requirements specified herein. A certificate of compliance, processing records, and laboratory reports shall accompany each shipment. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt, or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects, dirt, or foreign odor or flavor shall be cause for rejection of the entire lot.

4.4 Sampling Procedure and Acceptance Criteria for Testing of the Finished Product

Procedures for microbiological and analytical examinations shall be in accordance with 4.5. The sample size shall be 10 percent of the lot. The lot shall be rejected if one or more of the test results indicate nonconformance to test requirements.

4.5 Tests

4.5.1 Moisture

Analysis for moisture shall be made in accordance with American Dry Milk Institute publication titled "Standards for Grades for the Dry Milk Industry", Bulletin 916 or any other approved method.

4.5.2 Microbiological

The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1E, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

5.0 Preparation for Delivery

5.1 Packaging

5.1.1 Primary Package (Interim Packaging)

The product shall be flushed with nitrogen and vacuum packaged either in a tin plate can or a flexible pouch made from a laminate of 3 mil polyethylene/.35 mil aluminum/.75 mil polyester during shipment or until it is packaged in an inflight container.

5.1.2 Packaging Methods

If a tin plate can is used, the can and lid shall be steam sterilized immediately before packing. The sterile can shall be sealed under vacuum and inert atmosphere.

When the flexible pouch is used, the pouches shall be sealed in a porous paper with a latex sealing medium and autoclaved at 15 pounds pressure for at least 15 minutes.

5.1.3 Packing for Shipment

The shipping container shall be a corrugated container which meets or exceeds all provisions of the Uniform Freight Classification and the Motor Freight Classification. Sufficient cushioning material shall be used to protect the primary containers from crushing or puncture.

5.2 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance and processing records which indicate that the requirements of this document have been complied with. The microbiological and percent moisture records shall also accompany the shipment. The contents, lot number, quantity and date of production shall also be indicated on each container.

PRODUCTION GUIDE FOR INSTANT ORANGE JUICE

PRODUCTION GUIDE FOR INSTANT ORANGE JUICE

1.0 SCOPE

1.1 This document describes requirements for the processing, packaging, testing and shipment of instant orange juice.

2.0 Applicable Documents

2.1 The following documents form a part of this specification to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

Military Specifications

MIL-J-35073

Federal Specifications

PPP-B-636

3.0 Requirements

3.1 Preproduction Sample Approval

Representative samples which the contractor proposes to furnish shall be submitted for approval before production is commenced.

3.2 Material

3.2.1 Orange Juice Concentrate

Orange juice concentrate shall be prepared from clean, sound, fully matured fruit of the Valencia variety. The concentrate shall be prepared by processing in high vacuum, low temperature falling film concentrators. The orange juice concentrate shall be either dehydrated immediately

or frozen after concentrating and stored at temperatures of 0°F. or below until used for preparation into dehydrated orange juice. Pulp content of the reconstituted juice shall be not more than 10 percent by volume. Recoverable oil content of the reconstituted juice from the concentrate shall not exceed 0.005 percent by volume.

3.2.2 Entrapped Orange Oil Granules

Orange oil granules shall be prepared by entrapping orange oil in a mixture of sugar derived from one or more of the following: sucrose, dextrose, lactose, corn syrup or corn syrup solids. Other permissible carriers for the orange oil are gum acacia and other suitable vegetable gums. Food grade glycerol, emulsifiers, or anti-caking agents and butylated hydroxytoluene (BHT) may be used as optional ingredients. The entrapped orange oil granules shall meet the solubility test specified in Military Specification MIL-J-35073A, and 99.0 percent of the granules shall pass through U. S. Standard No. 10 sieve openings.

3.2.3 Oil of Orange

Oil of orange shall be cold-processed orange oil of single strength or partially deterpenized oil prepared therefrom, oil of orange shall be free of a terebinthic odor and shall meet the following requirements:

Specific Gravity	0.844 $\pm$ 0.002 at 25/25°C.
Optical Rotation	+ 96.5 $\pm$ 2.5 in 100 mm. tube at 25°C.
Refractive Index	1.4733 $\pm$ 0.0010 at 20°C.
Residue after Steam Distillation	3.5 percent $\pm$ 2.0 percent.
Heavy Metals	No darkening in color when tested in accordance with Military Specification (MIL-J-35073A).

3.2.4 Concentrated Essence of Orange

Concentrated essence of orange shall be prepared from natural components stripped from orange juice, or other parts of natural orange fruit. The concentrated essence of orange shall be blended with the instant orange juice powder prior to packaging, in such quantities as to contain no less than .030 and no more than .060 ml concentrated essence per 100 ml reconstituted juice. This concentrated essence of orange shall be blended with the dry instant orange juice product in a closed container and the product sealed in packages immediately thereafter to prevent loss of aromatic constituents.

3.2.5 Foam Stabilizers

Foam stabilizing ingredients may be added when necessary to aid in the dehydration process. These ingredients shall be approved by the Food and Drug Administration.

3.3 Processing

The concentrated orange juice and other ingredients shall be dehydrated. All equipment which liquid materials come in contact with shall be made of stainless steel or glass.

3.4 Finished Product

The instant orange juice shall consist of at least 97.5 percent by weight of natural juice solids. The moisture content shall not exceed 1.5 percent and the amount of foam stabilizers shall not exceed 1.0 percent. The product shall be free-flowing except for possible lumps or cakes which are fragile in nature and can readily be broken by shaking or application

of light pressure. The finished product shall be readily soluble when 17 grams of dehydrated material are reconstituted with 120 ml. of water at a temperature of approximately 45°F., to make about 137 ml. of juice. The final reconstituted juice shall measure between 12.25 and 12.75°Brix. The Brix/acid ratio of the reconstituted juice shall be no more than 18 to 1 and no less than 14 to 1. The reconstituted juice shall have a fine distinct orange juice flavor, and shall be free from bitter, oxidized, scorched, terebinthic or any other off-flavors.

3.4.1 Microbiological Requirements

The microbiological count shall comply with Addendum No. 1E, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts. The yeast and mold count shall not exceed 10 per gram of finished product.

3.4.2 Deliveries

All deliveries shall conform in every respect to the provisions of the Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

3.4.3 The product shall be produced in a facility which is under continuous U.S.D.A. inspection.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor is responsible for the performance of inspection requirements specified herein. A certificate of compliance, processing records, and laboratory reports shall accompany

each shipment. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of Packaged Food

If the packaging material contains any objectionable color, flavor or odor which is imparted to the food, the lot shall be rejected.

4.4 Examination of Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects, dirt or foreign odor or flavor shall be cause for rejection of the lot.

4.5 Sampling Procedure and Acceptance Criteria for Testing of the Finished Product

Procedures for microbiological examinations shall be in accordance with 4.6. The sample unit for testing shall be a composite of an entire package. The sample size shall be 10 percent of the lot. The lot shall be rejected if one or more of the test results indicate nonconformance to test requirements.

4.6 Tests

4.6.1 Microbiological Examination

The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1E, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

4.6.1.1 Yeast and Mold

The yeast and mold count shall be performed in accordance with the Standard Methods for the Examination of Dairy Products.

5.1 Packaging

5.1.1 Primary Container

The finished product may be bulk packaged in metal cans. Smaller units may be packaged in individual polyethylene bags over-packed in heat sealable bags containing a layer of aluminum foil of not less than 0.35 mil thickness.

5.1.2 Shipping Container

The shipping container shall be constructed of solid or corrugated fiberboard and must conform to all applicable requirements under the uniform Freight Classification and Federal Specification PPP-B-636. All material shall be resistant to water vapor and shall retain its strength during storage and shipment.

5.2 Shipping Instructions

Unless otherwise directed, the finished product shall be shipped to:

Transportation Officer
Bldg. 420
NASA-Manned Spacecraft Center
Houston, Texas
Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)

5.3 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance and processing records which indicate the requirements of this document have been complied with. The microbiological records shall also accompany the shipment. The date of production shall also be indicated on each container.

6.0 Destination Inspection

Each shipping container shall be inspected at destination by an authorized representative of the Government. This inspection shall include examination of the following:

a) Verify presence of Contractor's Certificate of Compliance

b) Verify presence of microbiological reports and verify compliance

c) Verify presence of processing records and verify compliance

PRODUCTION GUIDE

MOBILE QUARANTINE FACILITY FOOD PROCUREMENT

PRODUCTION GUIDE
MOBILE QUARANTINE FACILITY FOOD REQUIREMENT

1.0 SCOPE

This document describes the program to be implemented by the contractor for the production, packaging, testing and delivery of precooked frozen meals for use in supporting Mobile Quarantine Facility (MQF) simulations and missions. The MQF is a modified house trailer designed to house and serve as a biological barrier for the postflight quarantine of three Apollo Lunar Mission crewmembers and three support personnel during recovery and transport to the Crew Reception Area of the Lunar Receiving Laboratory at the Manned Spacecraft Center.

2.0 APPLICABLE DOCUMENTS

2.1 The following documents form a part of this specification to the extent specified herein:

SPECIFICATIONS:

PPP-B-00636 Box, Fiberboard

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Federal Food, Drug and Cosmetic Act and Regulations promulgated thereunder.

Grade "A" Pasteurized Milk Ordinance-1965. Recommendations of the U.S. Public Health Service.

Bakery Products: Definitions and Standards of Identity.

U. S. DEPARTMENT OF AGRICULTURE

Regulations Governing the Meat Inspection of the U. S. Department of Agriculture.

Regulations Governing the Grading and Inspection of Poultry and Edible Products Thereof and the United States Specifications for Classes, Standards, and Grades with Respect Thereto.

Regulations Governing the Grading and Inspection of Egg Products.

U. S. Standards for Grades of Carcass Beef

AMERICAN DRY MILK INSTITUTE, INC.

UNITED STATES STANDARDS for

Celery
Creole Onions
Potatoes

UNITED STATES STANDARDS for grades of

Butter
Canned Freestone Peaches
Cheddar Cheese
Frozen Green Beans and Frozen Wax Beans
Frozen Mixed Vegetables
Frozen Peas
Frozen Whole Kernel (or Whole Grain) Corn

3.0 REQUIREMENTS

3.1 Preproduction Sample Approval.

Representative samples which the contractor proposes to furnish shall be submitted for approval before production is commenced. These samples shall be sent to: Chief, Food and Nutrition, NASA-MSC, Code: DC7, Houston, Texas 77058.

3.2 Materials.

The products shall be manufactured from components which comply with the regulations of the Food and Drug Administration, U.S. Department of Health, Education and Welfare, or regulations of the Meat and Poultry Inspection, U.S. Department of Agriculture. All materials shall be of edible grade, clean, sound, wholesome, and shall be free from evidence of insect infestation or other objectionable foreign matter, odors and flavors. They shall be in excellent condition at time of use.

3.2.1 Fruits and Vegetables.

Fruits and vegetables; fresh, frozen, dried and canned shall be U.S. Grade No. 1 or U.S. Grade A (or U.S. Fancy) as applicable. When fruits and vegetables are used which do not have applicable U.S. Standards for grades, they shall be of best commercial grade available and shall possess good characteristic flavor, odor and color. They shall be free from quality defects.

3.2.2 Spices and Soluble Spice Flavors.

Natural spices or soluble spice flavors shall be used. If soluble spice flavors are used, they shall be used in amounts necessary to produce the flavor equivalent of the ground natural spices. Spices and soluble spice flavors shall be clean, free-flowing, dry, good commercial grade.

3.2.3 Milk and Dairy Products.

Milk and all dairy products shall be procured from a source approved by the U.S. Department of Agriculture and shall be U.S. Grade A. Nonfat dry milk shall be extra grade.

3.2.4 Eggs and Egg Products.

Eggs and egg products shall be procured from a source approved by the U.S. Department of Agriculture. Egg products shall be U.S. Grade A; fresh eggs shall be U.S. Grade AA.

3.2.5 Bread and Bakery Products.

Bread and bakery products shall be made in accordance with Definitions and Standards of Identity for Bakery Products as set forth under the Food, Drug and Cosmetic Act.

3.2.6 Meat, Poultry and Related Products.

3.2.6.1 Poultry.

Poultry shall be slaughtered and processed in a plant which is operated under the continuous inspection of the Poultry Inspection Division, Consumer and Marketing Service, U.S. Department of Agriculture. Poultry shall be U.S. Grade B or better.

3.2.6.2 Meat Products.

All meat products shall be prepared and processed only in a plant which is operated under the inspection of the Processed Meat Inspection Division, Consumer and Marketing Service, USDA, and shall be inspected, passed, and marked in accordance with regulations governing the Meat Inspection of the USDA.

3.2.6.2.1 Beef.

U.S. Grade Good or better beef shall be used.

3.3 Preparation and Processing of Materials.

3.3.1 Vegetables.

3.3.1.1 Fresh.

Fresh vegetables shall be thoroughly cleaned, washed, peeled when necessary, and trimmed to remove all defective and undesirable material. Precautions shall be taken to prevent discoloration and other deterioration of the product during these operations.

3.3.1.2 Frozen Vegetables.

Frozen vegetables which have been sufficiently cooked prior to freezing shall meet product requirements specified in 3.3.1.3. Frozen vegetables requiring cooking shall not be defrosted before cooking. Surface thawing sufficient for easy removal from carton is permitted.

3.3.1.3 Cooking and Filling.

Cooking of the fresh and frozen products shall be accomplished in the shortest time commensurate with the attainment of a firm but tender texture, good flavor, and natural color in the end product after freezing, thawing, and reheating to a serving temperature. The cooked product shall be filled into trays and shall enter the freezer within 2 hours after cooking.

3.3.2 Meat and Poultry Products.

3.3.2.1 Meat Products.

All meat products shall be held under proper refrigeration and shall show every evidence of freshness and quality at time of cooking. The temperature of the beef shall not be held longer than 1 hour in the warm state between cooking and entering the freezer. If further delay occurs, the product shall be properly protected from air exposure and shall be cooled promptly to a temperature of below 45°F; in no event shall the holding period exceed 6 hours. All bones, bone chips exceeding 1/4 inch in any dimension, cartilage, kidneys, blood clots, blood trimmings, bruised portions, thick tendons and ligaments, calcified periosteum, abdominal tunic, udders, prefemoral, prescapular and papliteal lymph glands, dehydrated trimmings and serous membranes shall be removed and excluded from all beef products prior to cooking.

3.4 Filling and Menu Assembly.

The menu components shall be placed in trays and the trays shall enter a freezer, 0°F or below, within 30 minutes after filling. If frozen components are used without further processing, they shall be assembled without thawing.

3.4.1 Freezing and Refrigeration.

The meals and components shall be frozen quickly at a temperature not higher than 0°F. The product temperature shall be reduced to 0°F or below within 12 hours after entering the freezer. The cased frozen product shall be held in forced air freezer storage for 12 hours (or longer) at 0°F or below, to insure equalization, of in-case temperature prior to shipment. At no time shall the product temperature exceed 20°F from time of loading for shipment to the time of delivery.

3.5 Finished Product.

After heating to a serving temperature of 160°F, the components in each meal shall possess a typical color, flavor and texture with no evidence of over or under cooking. No foreign material,

off-flavors, flavors foreign to the product, off odor, off color, or burned appearance shall be permitted. The finished product shall have a flavor, odor, and texture equal to or better than the preproduction samples. In addition, the finished product shall comply with 3.5.1 through 3.5.5, as applicable.

3.5.1 Meat and Poultry Products.

The cooked meat and poultry products shall be free from ligaments and any tendon material which has not been tenderized during cooking. The cooked meat shall contain not more than 1/4 inch in thickness of seam fat or surface fat, perpendicular to the longest dimension of the fat. The cooked meat and poultry products shall possess a typical appearance, firm but tender texture, and characteristic flavor.

3.5.2 Gravies and Sauces.

Gravies and sauces shall be of a smooth, thin sauce consistency, shall not be curdled or lumpy in appearance, and shall be of normal color for the type of gravy used.

3.5.3 Vegetables.

The vegetable products shall possess good, characteristic flavor, odor, and color, and a firm but tender texture.

3.5.4 Microbiological Requirements.

Microbiological examination shall be performed according to the procedure specified in 4.7. Total microbiological count on the contents of any one tray or bakery product shall not exceed 100,000 per gram. The total coliform count shall not be greater than 100 per gram and shall be negative for E.coli.

3.5.5 Deliveries.

All deliveries shall conform in every respect to the provisions of the Federal Food, Drug and Cosmetic Act and regulations promulgated thereunder.

3.6 The product shall be prepared only in an establishment which is regularly inspected by the U.S. Department of Agriculture. The product shall be handled and delivered under the same sanitary conditions that govern the handling and movements of similar products within and between establishments operated under USDA inspection.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection.

The Contractor shall be responsible for performing the examinations and tests specified in this document up to the point of delivery of the finished product at NASA. The records of all examinations and tests shall be delivered to: Chief, Food and Nutrition, DC-7, NASA-MSC, Houston, Texas 77058. For purposes of verification NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients.

Examination of all ingredients for conformance with the requirements specified with respect to identity and grade shall be ascertained by examination of labels, invoices, grade certificates or other valid documents.

4.2.1 Foreign Material.

Presence of foreign materials, e.g., glass, wood, metal, dirt or foreign odor or flavor shall be cause for rejection of the entire lot.

4.3 Processing and Preparation Examination.

Records shall be maintained when time, temperature, or formulation percentages are specified. Nonconformance to one or more requirements shall be cause for rejection of the lot or involved quantity of finished product made therefrom.

4.4 Examination of Packaged Food.

If the tray or covering material contains any objectionable color, flavor, or odor which is imparted to the food the lot shall be rejected.

4.5 Examination of Finished Product.

Examination shall be made after heating sample meals to a serving temperature of 160°F (product temperature). Presence of foreign material (e.g., metal, wood, glass, insect, dirt, etc:) or foreign odor or flavor shall be cause for the rejection of the lot.

4.6 Sampling Procedure and Acceptance Criteria for Testing of Finished Product.

Procedures for microbiological examinations shall be in accordance with 4.7. The sample unit or meal unit for testing shall

be the entire contents of a tray. The sample size shall be not less than 5 percent total of the number of identical units. A representative sample of the bakery products which are produced and packaged separately from the meal units shall be taken for microbiological examination. The lot shall be rejected if one or more tests results indicate nonconformance to test requirements.

4.7 Microbiological Examination.

4.7.1 Sample Preparation.

Samples shall be kept completely frozen at all times prior to analysis. Holding time prior to analysis shall be kept to a minimum. Place frozen meal in a refrigerator at 35°F to 40°F for one to three hours to temper. Aseptically transfer approximately equal weights of each component, totaling about 100 grams (combined weight), into a sterile, tared blender jar with screw cap. Weigh. Calculate weight of sample. Measure sterile distilled water into a sterile graduated cylinder, enough to equal 4 times the weight of sample (1:5 dil). Aseptically add about half of this to the blender jar. Blend for 1 minute, add remainder of water and blend for two additional minutes. Prepare a 1:10 dilution by pipetting 50 ml of the 1:5 suspension into a sterile, 50 ml buffered water blank (M/15 PO4, ph7 ± 0.2) contained in a regular 6-ounce dilution bottle. Shake the diluted suspension thoroughly to assure homogeneity.

4.7.2 Total Coliform Count.

From the 1:10 dilution, transfer immediately 2 ml aliquots into 5 Petri-plates and add an appropriate quantity of Violet Red Bile (VRB) agar, freshly prepared and cooled to a constant temperature of about 45°C. Thoroughly mix the inoculum with medium and allow to solidify. Overlayer with an additional 3-5 ml portion of the agar to minimize surface and spreader type growth. As soon as the agar is solidified, invert plates and incubate for 18-24 hours at 35°C. Count the typical (dark red) colonies at least 0.5 mm in diameter. A total count of all 5 plates greater than 100 constitutes rejection.

4.7.3 Total Microbial Count.

Proceed immediately after plating for total coliforms. Reshake thoroughly the 1:10 diluted suspension. Prepare consecutive decimal dilutions of 1:100 and 1:1000 by adding 11 ml to 99 ml buffered water blanks. Transfer 1 ml aliquots from each of the last two dilutions (1:100 and 1:1000) into duplicate Petri-plates and add an appropriate quantity of Plate Count Agar (tryptone glucose yeast extract agar), cooled to a constant temperature of about 45°C. Mix inoculum with medium

TABLE I

NUMBER OF COLIFORM COLONIES TO BE TRANSFERRED FROM VRB AGAR PLATES INTO E.C. MEDIUM[1]

Total Number of Coliform Organisms on Plates	Total Colonies Picked for E.C. Transfer	Total Number of Coliform Organisms on Plates	Total Colonies Picked for E.C. Transfer
5-7	1	55-56	29
8	2	57-58	30
9	3	-----	--
10	4	59-60	31
11-12	5	61-62	32
13-14	6	63-64	33
15	7	65-66	34
16-17	8	67	35
18-19	9	68-69	36
20-21	10	70-71	37
22-23	11	72-73	38
24-25	12	74-75	39
26	13	76-77	40
27-28	14	78-79	41
29-30	15	80	42
31-32	16	81-82	43
33-34	17	83-84	44
35-36	18	85-86	45
37-38	19	87-88	46
39	20	89-90	47
40-41	21	91-92	48
42-43	22	93	49
44-45	23	94-95	50
46-47	24	96-97	51
48-49	25	98-99	52
50-51	26	100	53
52	27	-----	--
53-54	28	-----	--

[1]Derived from a hypergeometric distribution applied to sampling from a finite population without replacement.

thoroughly and allow to solidify. Invert and incubate for 72 hours at 32°C. Count plates and calculate total counts. A total count greater than 100,000 per gram constitutes rejection.

4.7.4 E. Coli Count.

According to the requirement specified in 4.8.1.2, a coliform plate count greater than 100 constitutes rejection and further testing for E. coli is not required. When the total coliform count is from 3 to 100 inclusive, further testing for E. coli shall be performed. The number of colonies picked for examination shall be determined by reference to Table I. From each of the selected colonies, subculture into 2 fermentation tubes for E. coli broth and incubate at 45.5°C ± 0.2°C for 24 hours. Any positive E. coli broth tube will constitute rejection of the product.

5.0 PREPARATION FOR DELIVERY

5.1 Packaging.

5.1.1 Primary Food Tray.

All meals shall be supplied on rigid melamine trays of sufficient strength to withstand handling and meal preparation without breakage.

5.1.2 Individual Meal Carton.

Each individual meal shall be supplied in a folding carton made from food grade boxboard. Each carton shall be of suitable size and shape to provide a secure fit and of sufficient weight to protect the meal from damage in shipping and handling.

5.1.3 Multiple Meal Container.

Individually cartoned meals shall be packed in a corrugated container. Carton material and construction will comply with Mil. Spec. PPP-B-00636 as applicable. The maximum size of a multiple meal container shall be 15 1/2" x 10 1/2" x 7" O.D. Each multiple meal container shall contain written instructions for food preparation.

5.1.4 Insulated Shipping Container.

An insulated shipping container shall be provided for each day's food supply which shall include three multiple meal units, one each for breakfast, lunch and dinner. This container shall be constructed of corrugated fiberboard and insulated with rigid polyurethane foam. Provisions shall be made in the design of the container for packing the multiple meal unit

with dry ice. The polyurethane insulation shall be sufficient thickness to maintain the product temperature requirements specified in 5.1.6 for at least 24 hours.

5.1.5 Labeling.

All shipping containers shall be labeled or stenciled on at least 4 sides. The label shall state the day of intended use and the name of the consignee (i.e., NASA-MSC). Also a statement concerning storage conditions shall be included in the labeling. (Example: CAUTION: FROZEN FOODS, PERISHABLE). Lettering on the shipping container shall be a minimum of 1 inch in height.

5.1.6 Temperature During Shipment.

Temperature during shipment shall not exceed 20°F. Each shipping container shall be packed with dry ice prior to shipment.

5.1.6.1 Recording Thermometer.

A recording thermometer shall be placed in the shipping container containing the meals for Day 1. The recording thermometer shall be a suitable commercial type, temperature sensitive recorder capable of recording temperatures in excess of 20°F with an accuracy of ± 2°F. The recording thermometer shall be non-toxic and shall not impart any objectionable odor or flavor to the foods. A complete set of directions for conducting examination of the recording thermometer shall be incorporated into the shipping container.

5.1.7 Shipping Instructions.

Finished product shall be shipped via commercial Air Freight and addressed to:

Transportation Officer
Building 420
NASA-Manned Spacecraft Center
Houston, Texas 77058

Mark For: Dr. M. C. Smith, Jr.
Technical Monitor (DC-7)
Telephone (713) 483-5056

The Contractor shall notify the Technical Monitor by telephone or TWX of the expected time of arrival and the Air Bill number within 6 hours of the time of shipment.

5.1.8 Contractor Certification.

Each shipment shall be accompanied by the contractor's

Certificate of Compliance with the requirements of this document. This certificate shall include the following:

a. Product identification.

b. Microbiological test results.

c. Other data and test results, as applicable.

6.0 DESTINATION INSPECTION

Each shipping container shall be inspected at destination by an authorized representative of the government. This inspection shall verify product count and condition and shall include examination for the following:

a. Number of multiple meal containers received.

b. Verify that multiple meal containers are free from punctures, breakage and other defects.

c. Verify presence of contractor's Certificate of Compliance and required test data specified in 5.1.8.

d. Examine temperature recorder to insure that contents have not exceeded 20°F.

PRODUCTION GUIDE

APOLLO PREFLIGHT AND POSTFLIGHT FOOD PROCUREMENT

APOLLO PREFLIGHT AND POST-FLIGHT FOOD PROCUREMENT

1.0 SCOPE

This document describes the program to be implemented by the contractor for the production, packaging, testing and delivery of precooked frozen meals for use in support of the Apollo preflight and post-flight feeding program.

2.0 APPLICABLE DOCUMENTS

2.1 The following documents form a part of this specification to the extent specified herein:

SPECIFICATIONS:
PPP-B-00636 Box, Fiberboard

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

Grade "A" Pasteurized Milk Ordinance-1965. Recommendations of the U.S. Public Health Service.

Bakery Products: Definitions and Standards of Identity.

U.S. Department of Agriculture

Regulations Governing the Meat Inspection of the U.S. Department of Agriculture.

Regulations Governing the Grading and Inspection of Poultry and Edible Products Thereof and the United States Specifications for Classes, Standards, and Grades with Respect Thereto.

Regulations Governing the Grading and Inspection of Egg Products.

U.S. Standards for Grades of Carcass Beef.

American Dry Milk Institute, Inc.

United States Standards for
Celery
Creole Onions
Potatoes
Butter

United States Standards for (continued)
Canned Freestone Peaches
Cheddar Cheese
Frozen Green Beans and Frozen Wax Beans
Frozen Mixed Vegetables
Frozen Peas
Frozen Whole Kernel (or Whole Grain) Corn

3.0 REQUIREMENTS

3.1 Preproduction Sample Approval

Representative samples which the contractor proposes to furnish shall be submitted for approval before production is commenced. These samples shall be sent to: Chief, Food and Nutrition, NASA-MSC, Code: DC7, Houston, Texas 77058.

3.2 Materials

The products shall be manufactured from components which comply with the regulations of the Food and Drug Administration, U.S. Department of Health, Education and Welfare, or regulations of the Meat and Poultry Inspection, U.S. Department of Agriculture. All materials shall be of edible grade, clean, sound, wholesome, and shall be free from evidence of insect infestation or other objectionable foreign matter, odors, and flavors. They shall be in excellent condition at time of use.

3.2.1 Fruits and Vegetables

Fruits and vegetables; fresh, frozen, dried and canned shall be U.S. Grade No. 1 or U.S. Grade A (or U.S. Fancy) as applicable. When fruits and vegetables are used which do not have applicable U.S. Standards for grades, they shall be of best commercial grade available and shall possess good characteristic flavor, odor and color. They shall be free from quality defects.

3.2.2 Spices and Soluble Spice Flavors

Natural spices or soluble spice flavors shall be used. If soluble spice flavors are used, they shall be used in amounts necessary to produce the flavor equivalent of the ground natural spices. Spices and soluble spice flavors shall be clean, free-flowing, dry, good commercial grade.

3.2.3 Milk and Dairy Products

Milk and all dairy products shall be procured from a source approved by the U.S. Department of Agriculture and shall be U.S. Grade A. Nonfat dry milk shall be extra grade.

3.2.4 Egg and Egg Products

Eggs and egg products shall be procured from a source approved by the U.S. Department of Agriculture. Egg products shall be U.S. Grade A; fresh eggs shall be U.S. Grade AA.

3.2.5 Bread and Bakery Products

Bread and bakery products shall be made in accordance with Definitions and Standards of Identity for Bakery Products as set forth under the Food, Drug and Cosmetic Act.

3.2.6 Meat, Poultry and Related Products

3.2.6.1 Poultry

Poultry shall be slaughtered and processed in a plant which is operated under the continuous inspection of the Consumer and Marketing Service, U.S. Department of Agriculture. Poultry shall be U.S. Grade B or better.

3.2.6.2 Meat Products

All meat products shall be prepared and processed only in a plant which is operated under the inspection of the Consumer and Marketing Service, U.S.D.A., and shall be inspected, passed, and marked in accordance with regulations governing the Meat Inspection of the U.S.D.A.

3.2.6.2.1 Beef

U.S. Grade Good or better beef shall be used.

3.3 Preparation and Processing of Materials

3.3.1 Vegetables

3.3.1.1 Fresh

Fresh vegetables shall be thoroughly cleaned, washed, peeled when necessary, and trimmed to remove all defective and undesirable material. Precautions shall be taken to prevent discoloration and other deterioration of the product during these operations.

3.3.1.2 Frozen Vegetables

Frozen vegetables which have been sufficiently cooked prior to freezing shall meet product requirements specified in 3.3.1.3. Frozen vegetables requiring cooking shall not be defrosted before cooking. Surface thawing sufficient for easy removal from carton is permitted.

3.3.1.3 Cooking and Filling

Cooking of the fresh and frozen products shall be accomplished in the shortest time commensurate with the attainment of a firm but tender texture, good flavor, and natural color in the end product after freezing, thawing, and reheating to a serving temperature. The cooked product shall be filled into trays and shall enter the freezer within 2 hours after cooking.

3.3.2 Meat and Poultry Products

3.3.2.1 Meat Products

All meat products shall be held under proper refrigeration and shall show every evidence of freshness and quality at time of cooking. Beef shall not be held any longer than 1 hour in the warm state between cooking and entering the freezer. If further delay occurs, the product shall be properly protected from air exposure and shall be cooled promptly to a temperature of below 7°C; in no event shall the holding period exceed 6 hours. All bones, bone chips exceeding 1/4 inch in any dimension, cartilage, kidneys, blood clots, blood trimmings, bruised portions, thick tendons and ligaments, calcified periosteum, abdominal tunic, udders, prefemoral, prescapular and popliteal lymph glands, dehydrated trimmings and serious membranes shall be removed and excluded from all beef products prior to cooking.

3.4 Filling and Menu Assembly

The menu components shall be placed in trays and the trays shall enter a freezer, -17°C or below, within 30 minutes after filling. If frozen components are used without further processing, they shall be assembled without thawing.

3.4.1 Freezing and Refrigeration

The meals and components shall be frozen quickly at a temperature not higher than -17°C. The product temperature shall be reduced to -17°C or below within 12 hours after entering the freezer. The cased frozen product shall be held in forced air freezer storage for 12 hours (or longer) at -17°C or below, to insure equalization, of in-case temperature prior to shipment. At no time shall the product temperature exceed -7°C from time of loading for shipment to the time of delivery.

3.5 Finished Product

After heating to a serving temperature of 71°C, the components in each meal shall possess a typical color, flavor and texture with no evidence of over or undercooking. No foreign material, off-flavors, flavors foreign to the product, off odor, off color, or burned appearance shall be permitted. The finished product shall have a flavor, odor, and texture equal to or better than the preproduction samples. In addition, the finished product shall comply with 3.5.1 through 3.5.5, as applicable.

3.5.1 Meat and Poultry Products

The cooked meat and poultry products shall be free from ligaments and any tendon material which has not been tenderized during cooking. The cooked meat shall not contain seam fat or surface fat. The cooked meat and poultry products shall possess a typical appearance, firm but tender texture, and characteristic flavor.

3.5.2 Gravies and Sauces

Gravies and sauces shall be of a smooth, thin sauce consistency, shall not be curdled or lumpy in appearance, and shall be of normal color for the type of gravy used.

3.5.3 Vegetables

The vegetable products shall possess good, characteristic flavor, odor, and color, and a firm but tender texture.

3.5.4 Microbiological Requirements

Microbiological examination shall be performed according to the procedure specified in 4.7. Total microbiological count on the content of any one tray or bakery product shall not exceed 50,000 per gram. The total coliform count shall not be greater than 100 per gram and shall be negative for *E. coli*.

3.5.5 Deliveries

All deliveries shall conform in every respect to the provisions of the Federal Food, Drug and Cosmetic Act and Regulations promulgated thereunder.

3.6 The product shall be prepared only in an establishment which is regularly inspected by the U.S. Department of Agriculture. The product shall be handled and delivered under the same sanitary conditions that govern the handling and movements of similar products within and between establishments operated under U.S.D.A. inspection.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The contractor shall be responsible for performing the examinations and tests specified in this document up to the point of delivery of the finished product to NASA/MSC with the exception of the microbiological examination which will be conducted by NASA/MSC, Food and Nutrition or its assignee.

The records of all examinations and tests shall be delivered to: Chief, Food and Nutrition, DC7, NASA-MSC, Houston, Texas 77058. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations, or tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients for conformance with the requirements specified with respect to identity and grade shall be ascertained by examination of labels, invoices, grade certificates or other valid documents.

4.2.1 Foreign Material

Presence of foreign materials, e.g., glass, wood, metal, dirt or foreign odor or flavor shall be cause for rejection of the entire lot.

4.3 Processing and Preparation Examination

Records shall be maintained when time, temperature, or formulation percentages are specified. Nonconformance to one or more requirements shall be cause for rejection of the lot or involved quantity of finished product made therefrom.

4.4 Examination of Packaged Food

If the tray or covering material contains any objectionable color, flavor, or odor which is imparted to the food, the lot shall be rejected.

4.5 Examination of Finished Product

Examination, except microbiological, shall be made after heating sample meals to a serving temperature of 160°F (product temperature). Presence of foreign material (e.g., metal, wood, glass, insect, dirt, etc.) or foreign odor or flavor shall be cause for the rejection of the lot.

4.6 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance with 4.7. The sample unit or meal unit for testing shall be the entire contents of a tray. The sample size shall be not less than 5 percent of the total number of identical units. A representative sample of the bakery products which are produced and packaged separately from the meal units shall be taken for microbiological examination. The lot shall be rejected if one or more tests results indicate nonconformance to test requirements.

4.7 Microbiological Examination

4.7.1 Sample Preparation

Samples shall be kept completely frozen at all times prior to analysis. Holding time prior to analysis shall be kept to a minimum. The frozen meal shall be placed in the refrigerator at 2°C to 5°C for one to three hours to temper. Aseptically transfer approximately equal weights of each meal component, totaling about 50 grams (combined weight), into a sterile, tared blender jar. Weigh. Calculate weight of sample.

Measure sterile distilled buffered water into a sterile graduated cylinder, enough to equal 9 times the weight of sample (1:10 dil). Aseptically add sterile water to the blender jar and blend for 2 minutes.

4.7.2 Total Coliform Count

From the 1:10 dilution, transfer immediately 2 ml aliquots into each of 5 Petri-plates and add Violet Red Bile (VRB) agar, freshly prepared and cooled to a constant temperature of about 45°C. Thoroughly mix the inoculum with medium and allow to solidify. Overlay with an additional 3-5 ml portion of VRB. As soon as the agar is solidified, invert plates and incubate for 18-24 hours at 35°C. Count the typical (dark red) colonies at least 0.5 mm in diameter. A total count of all 5 plates greater than 100 constitutes rejection.

4.7.3 Total Microbial Count

From the 1:10 dilution, prepare consecutive decimal dilutions of 1:100 and 1:1000 by adding 11 ml to 99 ml sterile buffered water blanks. Transfer 1 ml aliquots from each of the two dilutions (1:100 and 1:1000) into duplicate Petri-plates and add Plate Count Agar (tryptone glucose yeast extract agar), cooled to a constant temperature of about 45°C. Mix inoculum with medium thoroughly and allow to solidify. Invert and incubate for 48 hours at 35°C. Count plates and calculate total counts. A total count greater than 50,000 per gram constitutes rejection.

4.7.4 E. coli Count

A coliform count greater than 100 per gram constitutes rejection and further testing for E. coli is not required. When the total coliform count is from 5 to 100 inclusive, further testing for E. coli shall be performed. The number of colonies picked for examination shall be determined by reference to Table I. From each of the selected colonies, subculture into 2 fermentation tubes containing E.C. medium and incubate at 45.5°C ± 0.2°C for 24 hours. Any positive E.C. medium tube will constitute rejection of the product.

5.0 PREPARATION FOR DELIVERY

5.1 Packaging

5.1.1 Primary Food Tray

All meals shall be supplied on rigid melamine trays of sufficient strength to withstand handling and meal preparation without breakage.

5.1.2 Multiple Meal Container

Individual meals shall be packed in a corrugated container. Carton material and construction will comply with Mil. Spec. PPP-B-00636 as applicable. Each multiple meal container shall contain written instructions for food preparation.

TABLE I

NUMBER OF COLIFORM COLONIES TO BE TRANSFERRED FROM VRB AGAR PLATES INTO E.C. MEDIUM[1]

Total Number of Coliform Organisms on Plates	Total Colonies Picked for E.C. Transfer	Total Number of Coliform Organisms on Plates	Total Colonies Picked for E.C. Transfer
5-7	1	55-56	29
8	2	57-58	30
9	3	-----	-----
10	4	59-60	31
11-12	5	61-62	32
13-14	6	63-64	33
15	7	65-66	34
16-17	8	67	35
18-19	9	68-69	36
20-21	10	70-71	37
22-23	11	72-73	38
24-25	12	74-75	39
26	13	76-77	40
27-28	14	78-79	41
29-30	15	80	42
31-32	16	81-82	43
33-34	17	83-84	44
35-36	18	85-86	45
37-38	19	87-88	46
39	20	89-90	47
40-41	21	91-92	48
42-43	22	93	49

TABLE I - (CONTINUED)

NUMBER OF COLIFORM COLONIES TO BE TRANSFERRED FROM VRB AGAR PLATES INTO E.C. MEDIUM[1]

Total Number of Coliform Organisms on Plates	Total Colonies Picked for E.C. Transfer	Total Number of Coliform Organisms on Plates	Total Colonies Picked for E.C. Transfer
44-45	23	94-95	50
46-47	24	96-97	51
48-49	25	98-99	52
50-51	26	100	53
52	27	------	----
53-54	28	------	----

[1]Derived from a hypergeometric distribution applied to sampling from a finite population without replacement.

5.1.3 Insulated Shipping Container

An insulated shipping container shall be provided which shall include three multiple meal units, one each for breakfast, lunch and dinner. This container shall be constructed of corrugated fiberboard and insulated with rigid polyurethane foam or a material with an equivalent insulating capacity. Provisions shall be made in the design of the container for packing the multiple meal unit with dry ice. The insulation shall be of sufficient thickness to maintain the product temperature requirements specified in 5.1.5 for at least 24 hours.

5.1.4 Labeling

All shipping containers shall be labeled or stenciled on at least 4 sides. The label shall be in accordance with labeling data provided by NASA under separate cover. Also, a statement concerning storage conditions shall be included in the labeling. (Example: CAUTION: FROZEN FOODS, PERISHABLE). Lettering on the shipping container shall be a minimum of 1 inch in height.

5.1.5 Temperature During Shipment

Temperature during shipment shall not exceed -12°C. Each shipping container shall be packed with dry ice prior to shipment.

5.1.5.1 Recording Thermometer

A recording thermometer shall be placed in the shipping container containing the meals for Day 1. The recording thermometer shall be a suitable commercial type, temperature sensitive recorder capable of recording temperatures in excess of -12°C with an accuracy of ± 2°C. The recording thermometer shall be non-toxic and shall not impart any objectionable odor or flavor to the foods. The recording thermometer may be obtained from NASA. A complete set of directions for conducting examination of the recording thermometer shall be incorporated into the shipping container.

5.1.6 Shipping Instructions

Finished product shall be shipped via commercial Air Freight or by contractor delivery vehicle and addressed to:

Transportation Officer
Building 420
NASA-Manned Spacecraft Center
Houston, Texas 77058

Mark for: M. C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

The Contractor shall notify the Technical Monitor by telephone or TWX of the expected time of arrival and the Air Bill number within 6 hours of the time of shipment.

5.1.7 Contractor Certification

Each shipment shall be accompanied by the contractor's Certificate of Compliance with the requirements of this document. This certificate shall include the following:

a. Product identification

b. Microbiological test results furnished by NASA

c. Other data and test results, as applicable.

6.0 DESTINATION INSPECTION

Each shipping container shall be inspected at destination by an authorized representative of the government. This inspection shall verify product count and condition and shall include examination for the following:

a. Number of multiple meal containers received.

b. Verify that multiple meal containers are free from punctures, breakage and other defects.

c. Verify presence of contractor's Certificate of Compliance and required test data specified in 5.1.8.

d. Examine temperature recorder to insure that contents have not exceeded -12°C.

PRODUCTION GUIDE

FROZEN FOOD FOR LUNAR RECEIVING LABORATORY

PRODUCTION GUIDE
FROZEN FOOD FOR LUNAR RECEIVING LABORATORY

1.0 SCOPE

This document describes requirements for the production, packaging, testing and delivery of food for use in supporting simulations and missions in the Crew Reception Area (CRA) of the Lunar Receiving Laboratory (LRL) during quarantine periods.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein:

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

Grade "A" Pasteurized Milk Ordinance-1965. Recommendations of the U. S. Public Health Service.

Bakery Products: Definitions and Standards of Identity.

U. S. DEPARTMENT OF AGRICULTURE

Regulations Governing the Meat Inspection of the U. S. Department of Agriculture.

Regulations Governing the Grading and Inspection of Poultry and Edible Products Thereof and the United States Specifications for Classes, Standards, and Grades with Respect Thereto.

Regulations Governing the Grading and Inspection of Egg Products.

U. S. Standards for Grades of Carcass Beef

U. S. Standards or Grades for Fruits and Vegetables

AMERICAN DRY MILK INSTITUTE, INC.

U. S. DEPARTMENT OF THE INTERIOR

Regulations Governing Processed Fishery Products

Bureau of Commercial Fisheries, U. S. Fish and Wildlife Service, U. S. Department of the Interior.

3.0 REQUIREMENTS

3.1 Materials

The products shall be manufactured from components which comply with the regulations of the Food and Drug Administration, U. S. Department of Health, Education and Welfare, or regulations of the Consumer Marketing Service, U. S. Department of Agriculture, or regulations of the Bureau of Commercial Fisheries, U. S. Fish and Wildlife Service, U. S. Department of the Interior. All materials shall be of edible grade, clean, sound, wholesome, and shall be free from evidence of insect infestation or other objectionable foreign matter, odors and flavors. They shall be in excellent condition at the time of use.

3.1.1 Bread and Bakery Products

Bread and Bakery Products shall be made in accordance with Definitions and Standards of Identity for Bakery Products as set forth under the Food, Drug and Cosmetic Act.

3.1.2 Eggs and Egg Products

Eggs and egg products shall be procured from a source approved by the U. S. Department of Agriculture. Egg products shall be U. S. Grade A; fresh eggs shall be U. S. Grade AA.

3.1.3 Fruits and Vegetables

Fruits and vegetables; fresh, frozen, dried and canned shall be U. S. Grade No. 1 or U. S. Grade A (or U. S. Fancy) as applicable. When fruits and vegetables are used which do not have applicable U. S. Standards for grades, they shall be of best commercial grade available and shall possess good characteristic flavor, odor and color. They shall be free from quality defects.

3.1.4 Meat, Poultry and Seafood

3.1.4.1 Meat Products

All Meat products shall be prepared and processed only in a plant which is operated under the inspection of the Consumer and Marketing Service, U.S.D.A., and shall be inspected, passed and marked in accordance with regulations governing the Meat Inspection of the U.S.D.A.

3.1.4.1.1 Beef

U. S. Grade Good or better beef shall be used.

3.1.4.2 Poultry

Poultry shall be slaughtered and processed in a plant which is operated under the continuous inspection of the Consumer and Marketing Service, U. S. Department of Agriculture. Poultry shall be U. S. Grade B or Better.

3.1.4.3 Fish

Fish and Seafood shall be prepared and processed in a plant which is operated under the continuous inspection of the Bureau of; Commercial Fisheries, U. S. Fish and Wildlife Service, Department of the Interior.

3.1.5 Milk and Dairy Products

Milk and all dairy products shall be procured from a source approved by the U. S. Department of Agriculture and shall be U. S. Grade A. Nonfat dry milk shall be extra grade.

3.1.6 Spices and Soluble Spice Flavors

Natural spices or soluble spice flavors shall be used. If soluble spice flavors are used, they shall be used in amounts necessary to produce the flavor equivalent of the ground natural spices. Spices and soluble spice flavors shall be clean, free-flowing, dry, good commercial grade.

3.2 Preparation and Processing of Materials

3.2.1 Vegetables

3.2.1.1 Fresh

Fresh vegetables shall be thoroughly cleaned, washed, peeled when necessary, and trimmed to remove all defective and undesirable material. Precautions shall be taken to prevent discoloration and other deterioration of the product during these operations.

3.2.1.2 Frozen

Frozen vegetables which have been sufficiently cooked prior to freezing shall meet product requirements specified in 3.2.1.3. Frozen vegetables requiring cooking shall not be defrosted before cooking. Surface thawing sufficient for easy removal from carton is permitted.

3.2.1.3 Cooking and Filling

Cooking of the fresh and frozen products shall be accomplished in the shortest time commensurate with the attainment of a firm but tender texture, good flavor, and natural color in the end product after

freezing, thawing, and reheating to a serving temperature. The cooked product shall be filled into trays and shall enter the freezer within 2 hours after cooking.

3.2.2 Meat, Fish and Poultry Products

3.2.2.1 Meat Products

All meat products shall be held under proper refrigeration and shall show every evidence of freshness and quality at time of cooking. The temperature of the beef shall not be held longer than 1 hour in the warm state between cooking and entering the freezer. If further delay occurs, the product shall be properly protected from air exposure and shall be cooled promptly to a temperature of below 45°F.; in no event shall the holding period exceed 6 hours. All bones, bone chips exceeding 1/4 inch in any dimension, cartilage, kidneys, blood clots, blood trimmings, bruised portions, thick tendons and ligaments, calcified periosteum, abdominal tunic, udders, prefemoral, prescapular and papliteal lymph glands, dehydrated trimmings and serous membranes shall be removed and excluded from all beef products prior to cooking.

3.2.2.2 Fish

3.2.2.2.1 Frozen

All fish products shall be held under proper refrigeration and shall show every evidence of freshness and quality at the time of cooking. The temperature of the fish shall not be held longer than 1 hour in the warm state between cooking and entering the freezer. If further delay occurs, the product shall be properly protected from air

exposure and shall be cooled promptly to a temperature of below 45°F.; in no event shall the holding period exceed 6 hours. Frozen fish shall be free of discoloration, foreign material and objectionable odors and flavors prior to cooking. Fish shall be free of scales, viscera, bruises, blemishes, blood spots, fins, pieces of fins and bones.

3.3 Filling

Food shall be placed in trays and the trays shall enter a freezer, 0°F. or below, within 30 minutes after filling.

3.3.1 Freezing and Refrigeration

Food shall be frozen quickly at a temperature not higher than 0°F. The product temperature shall be reduced to 0°F. or below within 12 hours after entering the freezer. The cased frozen product shall be held in forced air freezer storage for 12 hours (or longer) at 0°F. or below, to insure equalization, of in-case temperature prior to shipment.

3.4 Finished Product

After heating to a serving temperature of 160°F., food shall possess a typical color, flavor and texture with no evidence of over or under cooking. No foreign material, off-flavors, flavors foreign to the product, off odor, off color, or burned appearance shall be permitted. The finished product shall comply with 3.4.1 through 3.4.5., as applicable.

3.4.1 Meat

The cooked meat and poultry products shall be free from ligaments and any tendon material which has not been tenderized during cooking. The cooked meat shall contain not more than 1/4 inch in thickness of seam fat or surface fat, perpendicular to the longest dimension of the fat. The cooked meat and poultry products shall possess a typical appearance, firm but tender texture, and characteristic flavor.

3.4.1.1 Fish

The cooked fish shall contain no off-color, off-odor or flavors foreign to the product.

3.4.2 Gravies and Sauces

Gravies and sauces shall be of a smooth thin sauce consistency, shall not be curdled or lumpy in appearance, and shall be of normal color for the type of gravy used.

3.4.3 Vegetables

The vegetable products shall possess good, characteristic flavor, odor, and color, and a firm but tender texture.

3.4.4 Microbiological Requirements

Microbiological examination shall be performed according to the procedure specified in 4.6. Total microbiological count on the contents of any one tray or bakery product shall not exceed 50,000 per gram. The total coliform count shall not be greater than 100 per gram and shall be negative for E. coli.

3.4.5 Deliveries

All deliveries shall conform in every respect to the provisions of the Federal Food, Drug and Cosmetic Act and regulations promulgated thereunder.

3.5 The product shall be prepared only in an establishment which is regularly inspected by the U. S. Department of Agriculture. The product shall be handled and delivered under the same sanitary conditions that govern the handling and movements of similar products within and between establishments operated under U.S.D.A. inspection.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The Contractor shall be responsible for performing the examinations and tests specified in this document up to the point of delivery of the finished products at NASA. The records of all examinations and tests shall be delivered to: Chief, Food and Nutrition, DC-7, NASA/MSC, Houston, Texas 77058. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients for conformance with the requirements specified with respect to identity and grade shall be ascertained by examination of labels, invoices and grade certificates or other valid documents.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odor or flavor shall be cause for rejection of the entire lot.

4.3 Examination of Packaged Food

If the tray or covering material contains any objectionable color, flavor, or odor which is imparted to the food the lot shall be rejected.

4.4 Examination of Finished Product

Presence of foreign material, e.g., metal, wood, glass, insect, dirt, or foreign odor or flavor shall be cause for the rejection of the lot.

4.5 Sampling Procedure and Acceptance Criteria for Testing of Finished Product.

Procedures for microbiological examinations shall be in accordance with 4.6 or other procedures may be used by the supplier if they provide a quality assurance equivalent to that specified. A lot shall be rejected if one or more test results indicate nonconformance to test requirements.

4.6 Microbiological Examination

4.6.1 Sample Preparation

Samples shall be kept completely frozen at all times prior to analysis. Holding time prior to analysis shall be kept to a minimum. Place frozen meal in a refrigerator at 35°F. to 40°F. for 1 to 3 hours to temper. Aseptically transfer about 100 grams into a sterile, tared blender jar with screw cap. Weigh. Calculate weight of sample. Measure sterile distilled water into a sterile graduated cylinder, enough to equal 4 times the weight of sample (1:5 dil). Aseptically add about half of this to the blender jar. Blend for 1 minute, add

remainder of water and blend for 2 additional minutes. Prepare a 1:10 dilution by pipetting 50 ml of the 1:5 suspension into a sterile, 50 ml buffered water blank (M/15 P04, ph7 $\pm$ 0.2) contained in a regular 6-ounce dilution bottle. Shake the diluted suspension thoroughly to assure homogeneity.

4.6.2 Total Coliform Count

From the 1:10 dilution transfer immediately 2 ml aliquots into 5 Petri-plates and add an appropriate quantity of Violet Red Bile (VRB) agar, freshly prepared and cooled to a constant temperature of about 45°C. Thoroughly mix the inoculum with medium and allow to solidify. Overlay with an additional 3-5 ml portion of the agar to minimize surface and spreader and incubate for 18-24 hours at 35°C. Count the typical (dark red) colonies at least 0.5 mm in diameter. A total count of all 5 plates greater than 100 constitutes rejection.

4.6.3 Total Microbial Count

Proceed immediately after plating for total coliforms. Reshake thoroughly the 1:10 diluted suspension. Prepare consecutive decimal dilutions of 1:100 and 1:1000 by adding 11 ml to 99 ml buffered water blanks. Transfer 1 ml aliquots from each of the last two dilutions (1:100 and 1:1000) into duplicate Petri-plates and add an appropriate quantity of Plate Count Agar (tryptone glucose yeast extract agar), cooled to a constant temperature of about 45°C. Mix inoculum with medium thoroughly and allow to solidify. Invert and incubate for 48 hours at 32°C. Count plates and calculate total counts. A total count greater than 100,000 per gram constitutes rejection.

4.6.4 E. Coli Count

According to the requirement specified in 4.6.2., a coliform plate count greater than 100 constitutes rejection and further testing for E. coli is not required. When the total coliform count is from 5 to 100 inclusive, further testing for E. coli shall be performed. The number of colonies picked for examination shall be determined by reference to Table I. From each of the selected colonies, subculture into 2 gas fermentation tubes of E. coli broth and incubate at 45.5°C. for 24 hours. Any positive E. coli broth tube will constitute rejection of the product.

5.0 PREPARATION FOR DELIVERY

5.1 Packaging

5.1.1 Container

The contents shall be placed in a rigid aluminum tray or other suitable material of sufficient strength to withstand handling and meal preparation without breakage or leakage. The filled containers shall be completely covered with a sheet of aluminum foil of 0.001 inch nominal thickness or other suitable material.

5.1.2 Packing

The containers shall be packed in corrugated containers. Carton materials and construction shall comply with Mil-Spec. PP-B-636 as applicable.

5.1.3 Labeling

Each shipping container shall contain the name of the consignee (i.e., NASA-MSC). Also a statement regarding storage conditions shall

be included in the labeling. (Example: CAUTION: FROZEN FOODS, PERISHABLE). Lettering on the shipping container shall be a minimum of 1 inch in height.

5.1.4 The shipping containers shall be packed with enough dry ice to insure that the food shall remain frozen during shipment.

5.1.5 Shipping Instructions

Finished product shall be shipped via commercial Air Freight or by refrigerated truck and addressed to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas 77058

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone (713) 483-5056

The supplier shall notify the Technical Monitor by telephone or TWX of the expected time of arrival and the Air Bill number within 6 hours of the time of shipment if shipment is by Air Freight; or, by telephone, upon delivery if shipment is by truck from supplier.

5.1.6 Contractor Certification

Each shipment shall be accompanied by the Contractor's certificate of compliance with the requirements of this document. This certification shall include the following:

a. Product identification

b. Microbiological test results

c. Other data, as applicable

6.0 DESTINATION INSPECTION

Each shipping container shall be inspected at destination by an authorized representative of the government. This inspection shall verify presence of products ordered and condition and shall include examination for the following:

a. Presence of individual food items

b. Verify that food containers are free from puncture, breakage, and other defects

c. Verify delivery of foods in the frozen state

PRODUCTION GUIDE FOR BREAD

PRODUCTION GUIDE FOR BREAD

1.0 Scope

1.1 This document describes the requirements for the production, packaging, testing and delivery of bread for aerospace feeding systems.

2.0 Classification

2.1 Bread shall be of the type listed below:

Type I - White

Type II - Cheese

Type III - Rye (Seedless)

Type IV - Raisin

3.0 Applicable Documents

The following documents form a part of this specification to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations promulgated thereunder.

Bakery Products: Definitions and Standards of Identity.

U. S. Department of Agriculture

U. S. Standards for Grades of Butter

U. S. Standards for Grades of Nonfat Dry Milk (Spray Process)

U. S. Standards for Grades of Dry Whole Milk

U. S. Standards for Dry Whey

U. S. Standards for Grades of Processed Raisins

U. S. Department of Agriculture Regulations Governing the Grading and Inspection of Egg Products

4.0 Requirements

4.1 Materials. The products shall be manufactured from materials which comply with the regulations of the Food and Drug Administration, U. S. Department of Health, Education and Welfare. All materials shall be of edible grade, clean, sound, wholesome, and free from insect manifestation or other objectionable foreign matter, odors, and flavors.

4.1.1 Wheat flour. The flour shall be prepared from hard or soft wheat and may be bleached or unbleached.

4.1.2 Rye flour. Rye flour shall be white rye flour or medium rye flour.

4.1.3 Shortening. Shortenings shall be unhydrogenated or hydrogenated cottonseed, peanut, corn or coconut oil, hydrogenated, soybean oil, or lard, or any combination of these. It may contain additives permitted under the provisions of the Federal Food, Drug, and Cosmetic Act.

4.1.4 Milk and Milk Products. One or more of the following milk products may be used: dry whole milk, nonfat dry milk, dry whey and butter. Butter shall be grade B or better. Dry whole milk, nonfat dry milk, and dry whey shall be extra grade.

4.1.5 Sugars: One or more of the following sugars may be used: sucrose (liquid or granulated), lactose, invert sugar, dextrose, corn syrup solids and honey.

4.1.6 Salt. Salt shall be clean, white, free flowing, food grade sodium chloride.

4.1.7 Raisins. Raisins shall be Thompson seedless unbleached or seeded Muscat raisins. Raisins shall be U.S.D.A. Grade B or better.

4.1.8 Safflower Oil - Safflower oil shall be an optional ingredient for raisin bread.

4.1.9 Yeast. Yeast shall be either active dry yeast or compressed yeast (Saccaromyces cerevisiae).

4.1.10 Eggs and egg products. One or more of the following egg products shall be used: frozen eggs, dried eggs, egg white, frozen egg white, and dried egg white. All egg products shall be prepared under the continuous inspection of the U. S. Department of Agriculture and bear the U.S.D.A. inspection shield mark.

4.1.11 Dough improvers. Dough improvers shall be restricted to those permitted under the provisions of the Federal Food, Drug, and Cosmetic Act.

4.1.12 Mold inhibitors. Mold inhibitors shall be those permitted under the provisions of the Federal Food, Drug and Cosmetic Act.

4.2 Preparation and processing. Each type of bread shall be prepared by moistening the flour with water and adding the optioned ingredients specified in Section 4.1.

The dough shall be kneaded and placed in individual baking pans. The product shall be retained in the oven until it is well baked and the crust is firm and tender. The product shall be sliced and packaged under sanitary conditions.

4.3 Finished product. The baked product shall have a good volume with a fine even texture. The finished product shall contain no foreign material or objectionable flavors and odors.

4.3.1 Freshness. Bread shall be shipped within 24 hours after production.

4.3.2 Dimensions of slices. The height of each slice shall not exceed 3 3/4 $\pm$ 1/4". The width shall not exceed 5 1/4 $\pm$ 1/4".

4.3.3 Analytical requirements.

4.3.3.1 Total solids. The total solids content shall not be less than 62 percent.

4.3.3.2 Microbiological requirements. The microbiological composition shall comply with the Microbiological Requirements for Space Food Prototypes, Space Food, Prototype Production Guide, Addendum No. 1D, U. S. Army Natick Laboratories, Natick, Massachusetts.

5.0 Quality Assurance Provisions.

5.1 Responsibility for Inspection. The Contractor shall be responsible for performing the examinations and tests specified up to the point of delivery of the finished product at NASA. The records of all examinations and tests shall be delivered to: Chief, Food and Nutrition, DC-7, NASA/MSC, Houston, Texas 77058. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

5.2 Examination of Ingredients. Examination of all ingredients for conformance with the requirements specified with respect to identity and grade shall be ascertained by examination of labels, invoices, grade certificates or other valid documents.

5.2.1 Foreign Material. The presence of foreign material, e.g., glass, wood, metal, insects, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

5.3 Examination of Finished Product. The presence of foreign material, e.g., metal, wood, glass, insects, dirt, or foreign odor or flavor shall be cause for rejection of the lot.

5.4 Testing of the Finished Product.

5.4.1 Microbiological. The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1D, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

5.4.2 Chemical Analysis. The analysis for the total solids content shall be made in accordance with the Official Methods of Analysis of the Association of Official Agricultural Chemists, Chapter: Cereal Foods; Section: Bread.

6.0 Preparation for Delivery.

6.1 Primary Container. The primary container shall be regenerated cellulose film or plastic film. The product shall be so packaged that protection from dirt, filth or other contamination is insured.

6.1.2 Closure: The primary container shall be closed by a heat seal.

6.2 Shipping Container.

6.2.1 Construction

The shipping container shall be constructed of 200 lb. test, C-flute, single wall, corrugated fiberboard. The style of the container shall

be a Regular Slotted Container (RSC). The dimensions of the shipping container shall be such that the bread is held securely during shipment. The Uniform Freight Classification Rule 41 should also be used to determine weight restrictions and other container requirements.

6.2.2 Interior Packing. Sufficient corrugated inserts shall be used to prevent crushing when more than one layer of bread is packed in the shipping container.

6.2.3 Closure. The shipping container shall be closed using two strips of 3 inch reinforced tape. Each strip shall extend 2 inches over the end of the carton.

6.3 Shipping Instructions.

The finished product shall be shipped and addressed to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas 77058

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

6.4 Contractor Certification. Each shipment shall be accompanied by the Contractor's Certificate of Compliance that indicates the requirements of this document have been complied with. Each loaf shall be labeled with Type Bread, Lot No. and date of production. This information shall be stated in the Contractor's Certificate of Compliance.

The microbiological records shall also be submitted to the Technical Monitor. This must be done no later than 6 days after delivery of the product.

6.5 Destination inspection. Each shipping container shall be inspected at destination by an authorized representative of the government. This inspection shall include examination for the following:

a. Verify that the shipping containers are free from punctures, breakage and other defects.

b. Verify presence of contractor's Certificate of Compliance.

c. Verify that the heat seal on each loaf is still intact.

PRODUCTION GUIDE FOR MARGARINE

PRODUCTION GUIDE FOR MARGARINE

1.0 Scope

1.1 This document describes requirements for the processing, packaging, testing and shipment of margarine.

2.0 Applicable Documents

2.1 The following documents form a part of this specification to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

U. S. Department of Agriculture

U. S. Standards for Grades for Nonfat Dry Milk

U. S. Standards for Grades for Butter

U. S. Standards for Condition of Food Containers

3.0 Requirements

3.1 The product shall be manufactured from components which comply with the regulations of the Food and Drug Administration. All materials shall be of edible grade, clean, sound, wholesome and shall be free from evidence of insect infestation or other objectionable foreign matter, odors and flavors. They shall be in excellent condition at the time of use.

3.1.1 Fat Ingredients

Vegetable oils shall be used. The oils shall be of high quality and shall be properly refined. Soybean oil shall be partially hydrogenated.

All other oils may be hydrogenated. Citric acid, isopropyl citrate, not to exceed 0.02 percent, and a stearyl citrate, not to exceed 0.15 percent by weight of the oil, may be incorporated into the oil.

3.1.2 Milk

The raw milk used in the preparation of the product shall be drawn from cows in herds accredited as tuberculosis-free and certified brucellosis free by the U. S. Department of Agriculture. Milk shall be sweet, clean, and free from objectionable flavors and odors.

3.1.3 Butter

Butter shall be Grade A or higher as defined in the U. S. Standards for Grades of Butter.

3.1.4 Dry Milk Products

Nonfat dry milk shall meet the requirements for Extra Grade as defined in U. S. Standards for Grades for Nonfat Dry Milk.

3.1.5 Salt

Salt shall be crystalline, free flowing evaporated sodium chloride of food grade quality. Iodized salt shall not be used. Five ppm of sodium ferrocyanide may be added.

3.1.6 Artificial Flavoring Material

Artificial flavoring material shall be diacetyl, added as such, or as starter distillate, or produced during the preparation of the product as a result of the addition of citric acid or harmless citrates permitted by the Federal Food, Drug, and Cosmetic Act. Food approved flavoring materials in semblance of butter may also be used.

3.1.7 Artificial Coloring

Artificial coloring shall be any edible coloring material permitted by the Federal Food, Drug, and Cosmetic Act.

3.1.8 Preservatives

Preservatives shall be sodium benzoate, benzoic acid, or potassium sorbate, or a combination thereof, permitted by the Federal Food, Drug, and Cosmetic Act.

3.1.9 Emulsifying Agents

Emulsifying agents shall be these approved by the Food and Drug Administration for use in margarine.

3.1.10 Vitamin A Ingredients

Vitamin A ingredients shall conform to the requirements of the definition and Standards of Identity for Oleomargarine (Margarine).

3.2 Finished Product

The product shall have a pleasing delicate flavor and aroma, free from rancidity or any other foreign flavor and odor. It shall have a uniform yellow color and finish with a smooth body and texture, free from crumbliness, graininess, grittiness, oiliness, or droplets of moisture visible throughout the body of the product. The finished product shall be of such consistency that will give it good spreadability at 50°F. with excellent meltdown characteristics, as evidenced by the absence of any discernible wax-like texture in the mouth.

3.2.1 Composition

The composition of the finished product shall comply with the following table:

Fat	-	not less than 80.0 percent
Vitamin A	-	not less than 15,000 USP Units per pound
Peroxide Value of the Oil	-	not more than 3.0 milliequivalents per kilogram of fat

3.2.2 Microbiological Requirements

The microbiological count shall comply with Addendum No. 1D, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts. The yeast and mold count shall not exceed 20 per gram of finished product.

3.2.3 Deliveries

All deliveries shall conform in every respect to the provisions of the Federal Food, Drug, and Cosmetic Act and Regulations Promulgated Thereunder.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor is responsible for the performance of inspection requirements specified herein. A certificate of compliance, processing records, and laboratory reports shall accompany each shipment. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of Packaged Food

If the packaging material contains any objectionable color, flavor, or odor which is imparted to the food the lot shall be rejected.

4.4 Examination of Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects, dirt, or foreign odor or flavor shall be cause for rejection of the lot.

4.5 Sampling Procedure and Acceptance Criteria for Testing of the Finished Product

Procedures for microbiological and analytical examinations shall be in accordance with 4.6. The sample unit for testing shall be a composite of an entire package. The sample size shall be 10 percent of the lot. The lot shall be rejected if one or more of the test results indicate nonconformance to test requirements.

4.6 Tests

4.6.1 Microbiological Examination

The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1D, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

4.6.1.1 Yeast and Mold

The yeast and mold count shall be performed in accordance with the Standard Methods for the Examination of Dairy Products.

4.6.2 Analytical Examination

4.6.2.1 Fat

The determination of the fat content shall be made in accordance with the Official Methods of Analysis (AOAC), Chapter: Dairy Products; Section: Butter; Method: Direct.

4.6.2.2 Peroxide Value

The peroxide value shall be determined by the Official and Tentative Methods of the American Oil Chemists Society, Section C, Commercial Fats and Oil Method Cd 8-53.

4.6.2.3 Vitamin A

Vitamin A content shall be determined by the colorimetric method specified in Methods of Vitamin Assay.

5.0 Preparation for Delivery

5.1 Packaging

5.1.1 Primary Package

The product shall be packaged in an aluminum or food approved plastic of sufficient strength to retain its shape and protect the product

throughout shipping and handling. The minimum weight of the tub shall be 1/2 lb. (8 oz.). Closure of the package shall be accomplished by use of a polyethylene snap-on cover. The package closure shall be sufficiently tight to prevent contamination of the product by any foreign material.

5.1.2 Shipping Container

The shipping container shall be constructed of solid or corrugated fiberboard and must conform to all applicable requirements under the Uniform Freight Classification and Federal Spec. #PPP-B-636C.

As an alternative, the shipping container may be an insulated container. It shall, however, be reinforced with a corrugated fiberboard container. All material shall be resistant to water vapor and shall retain its strength during storage and shipment.

5.2 Temperature During Shipment

Temperature during shipment shall not exceed 40°F. A recording thermometer shall be placed in each shipping container to monitor the temperature.

5.3 Shipping Instructions

The finished product shall be shipped to:

Transportation Officer

Bldg. 420

NASA/Manned Spacecraft Center

Houston, Texas

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)

5.4 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance and processing records which indicate that the requirements of this document have been complied with. The microbiological records shall also accompany the shipment. The date of production shall also be indicated on each container.

6.0 Destination Inspection

Each shipping container shall be inspected at destination by an authorized representative of the government. This inspection shall include examination of the following:

a) Verify presence of Contractor's Certificate of Compliance

b) Verify presence of microbiological reports and verify compliance

c) Verify presence of processing records and verify compliance

d) Verify temperature on the recorder and verify compliance

PRODUCTION GUIDE FOR ICE CREAM

PRODUCTION GUIDE FOR ICE CREAM

1.0 Scope

1.1 This document describes the requirements for the production, packaging, and shipment of ice cream for aerospace feeding systems.

2.0 Applicable documents

2.1 The following documents form a part of this specification to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

U. S. Department of Agriculture

U. S. Standards for Grades of Nonfat Dry Milk

U. S. Standards for Grades of Dry Whey

U. S. Standards for Grades of Dry Whole Milk

U. S. Standards for Grades of Dry Buttermilk

U. S. Standards for Grades of Butter

General Specifications for Dairy Plants Approved for U.S.D.A. Inspection and Grading Service.

Dairy Plants Surveyed and Approved for U.S.D.A. Grading Service

3.0 Requirements

3.1 The products shall be manufactured from components which comply with the regulations of the Food and Drug Administration. All materials shall be of edible grade, clean, sound, wholesome and shall be free from evidence of insect infestation or other objectionable foreign matter, odors and flavors. They shall be in excellent condition at the time of use.

3.1.1 Milk

The raw milk used in the preparation of the products shall be drawn from cows in herds accredited as tuberculosis - free and certified brucellosis free by the U.S. Department of Agriculture.

3.1.2 Milk Products

Skim milk (regular and condensed), cream, butter oil, anhydrous milk fat, whey and buttermilk may be used in manufacturing the ice cream. These ingredients shall not be adulterated by the addition of any preservatives or neutralizers.

3.1.3 Butter or Churned Butterfat

Butter or churned butterfat shall be Grade A or higher as defined in the U. S. Standards for Grades of Butter.

3.1.4 Dry Milk Products

Dry milk products shall be extra grade as defined in the U. S. Standards for Grades of: Nonfat Dry Milk, Dry Whole Milk, Dry Buttermilk, Dry Whey.

3.1.5 Non-Milk Ingredients

Optional ingredients including sweetening ingredients, stabilizers, and emulsifiers shall be those permitted by the Frozen Desserts, Definitions and Standards of the Federal Food, Drug and Cosmetic Act.

3.1.6 Flavoring Ingredients and Coloring

Flavoring ingredients and coloring shall be those permitted by the Frozen Desserts, Definitions and Standards of the Federal Food, Drug and Cosmetic Act.

3.1.7 Chocolate and Cocoa

Chocolate and cocoa products shall meet the requirements of the Definitions and Standards of Identity for Cocoa Products of the Federal Food, Drug and Cosmetic Act.

3.1.8 Egg Products

Egg products shall be procured from a source approved by the U. S. Department of Agriculture. Egg products shall be U. S. Grade A.

3.1.9 Salt

Salt shall be noniodized white, refined, sodium chloride of food grade quality.

3.1.10 Water

The water used in the preparation of products specified herein shall be of a safe sanitary quality and approved by State or Federal authorities.

3.2 Preparation

3.2.1 Processing

All incoming milk or fluid milk products, unless processed within two hours, shall be cooled immediately and held at 45°F. or lower until processing is commenced.

After formulation, the entire mix, except for flavoring ingredients, shall be pasteurized by heating to not less than 155°F. and holding at that for not less than 30 minutes, or by heating to 175°F. and holding at that temperature for not less than 25 seconds.

3.3 Finished Product

3.3.1 Composition

The composition of the finished product shall comply with the following table:

Milk fat, not less than	(by weight)	10.0 percent
Total solids	(by weight)	38.0 percent

3.3.2 Configuration

The finished product shall be cut or molded into blocks with the following dimensions: 3" x 2 1/2" x 3/4".

3.3.3 Microbiological Requirements

The microbiological count and examination shall comply with Addendum No. 1D, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

3.3.4 Texture and Flavor

The finished product shall have a smooth body and shall be free from sandiness and large ice crystals. The frozen ice cream shall be free of objectionable odors and flavors.

3.4 Deliveries

All deliveries shall conform in every respect to the provisions of the Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

3.4.1 Plant, Equipment and Workmanship

The receiving stations, processing plant, premises, equipment and personnel practices used in the production and transportation of these items shall meet the applicable facilities and sanitation requirements specified in the General Specifications for Dairy Plants Approved for U.S.D.A. Inspection and Grading Service.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor is responsible for the performance of inspection requirements specified herein. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of Packaged Food

If the packaging material contains any objectionable color, flavor, or odor which is imparted to the food, the lot shall be rejected.

4.4 Examination of Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects, dirt or foreign odor or flavor shall be cause for the rejection of the lot.

4.5 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance with 4.6. The sample unit for testing shall be a composite of the entire contents of a package. The sample size shall be 10 percent of the lot.

A lot for a given procurement shall be one flavor of ice cream. The lot shall be rejected if one or more test results indicate non-conformance to test requirements.

4.6 Tests

4.6.1 Microbiological Examination

The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1D, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

4.6.2 Composition Analysis

Analytical determinations shall be made in accordance with the following methods from Official Methods of Analysis (AOAC), Chapter: Dairy Products, Section: Ice Cream and Frozen Desserts.

Test	Method
Milk Fat	Roese-Gottlieb
Total Solids	Total Solids

5.0 Preparation for Delivery

5.1 Packaging

5.1.1 Primary Package

The primary container shall be a flexible pouch made from a laminate of mylar/aluminum/modified polyethylene.

The style of the pouch shall be a flat bag with the following dimensions: 4 1/2" $\pm$ 1/8" x 7" $\pm$ 1/8". The width of all heat seals shall be 3/8" $\pm$ 1/8".

5.1.2 Labeling

A 2" x 3/4" piece of TA-44-2 tape shall be placed on each package. The following information shall be placed on the tape: name of product, part number, serial number, date packaged and place packaged.

5.1.3 Method of Packaging

The ice cream blocks, wrapped in foil by the processor, shall be supercooled in a liquid nitrogen freezer. The ice cream shall not come in direct contact with the liquid nitrogen. The ice cream blocks shall be taken from the liquid nitrogen container and the foil removed. The ice cream shall be placed in the primary package (5.1.1) and sealed under vacuum at a pressure of 50 mm of mercury or less. Immediately after packaging the ice cream shall be placed in a freezer. The temperature of the freezer shall not exceed 0°F.

5.1.4 Temperature Recorder

A temperature recorder shall be placed in each shipping container. The recorder shall be capable of measuring and recording the temperature with a range of -10°F to 40°F. The temperature recorder shall be non-toxic and shall not impart any objectionable odor or flavor to the product.

5.1.5 Shipping Container

The shipping container shall be Part No. 40FW manufactured by Polyform Packers, Inc. or a shipping container of equivalent insulating capacity. The container shall be packed with dry ice.

5.1.5.1 Temperature During Shipment

At no time during shipment shall the temperature of the ice cream exceed 0°F.

5.1.6 Shipping Instructions

Each shipping container shall contain the name and address of the consignee. Shipping instructions shall be provided by NASA prior to each shipment. Also, the following statement regarding storage conditions shall be included in the outside labeling:

Frozen Foods

Perishable

Lettering on the shipping container shall be a minimum of 1 inch in height.

PRODUCTION GUIDE

PRECOOKED SLICED MEAT AND POULTRY PRODUCTS

PRODUCTION GUIDE

PRECOOKED SLICED MEAT AND POULTRY PRODUCTS

1.0 Scope

1.1 This document describes the requirements for the processing, packaging and shipment of precooked sliced meat and poultry products.

2.0 Classification

2.1 Products shall be of the type listed below:

Type I - Sliced Ham

Type II - Sliced Ham and Cheese

Type III - Sliced Smoked Turkey

2.2 Applicable Documents

2.2.1 The following documents form a part of this Production Guide to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

U. S. Department of Agriculture

Regulations Governing the Meat Inspection of the U. S. Department of Agriculture.

Regulations Governing the Grading and Inspection of Poultry and Edible Products Thereof and United States Specifications of Classes, Standards and Grades with Respect Thereto.

3.0 Requirements

3.1 Materials

The products shall be manufactured from components which comply with the regulations of the Food and Drug Administration, U. S. Department of Health, Education and Welfare, or regulations of the Meat Inspection Division and the Poultry Division, U. S. Department of Agriculture. All

materials shall be of edible grade, clean, sound, wholesome and shall be free from evidence of insect infestation or objectionable foreign matter. odors and flavors. Material shall be in excellent condition at the time of use.

3.1.1 Meat

Meat and poultry products shall be prepared and processed only in a plant which is operated under the continuous inspection of the Consumer Marketing Service, United States Department of Agriculture (U.S.D.A.). Poultry shall be U. S. Grade B or better.

3.1.2 Curing Ingredients

Curing ingredients shall be those permitted by the Consumer Marketing Service, U.S.D.A.

3.1.3 Additives

Additives shall be those approved by the Consumer Marketing Service, U.S.D.A.

3.2 Processing

3.2.1 Curing

Where applicable, the meat components shall be thoroughly cured with a well-blended mixture of fine salt and sugar and with the permissible nitrates and nitrites used in any combination permitted by the Consumer Marketing Service, U.S.D.A.

3.2.2 Smoking

Where applicable, the product shall be thoroughly smoked and cooked and as soon as practical after stuffing and necessary handling.

3.2.3 Cooking

The product shall be thoroughly and uniformly cooked to an internal temperature of not less than 155°F.

3.3.3 Chilling

The internal temperature shall not exceed 40°F. five hours after cooking.

3.3.4 Slicing

A mechanical slicer shall be used for slicing the product and the product shall be packaged immediately after slicing.

3.3.5 Storage

The storage temperature prior to shipment of the product shall not exceed 40°F.

3.4 Finished Product

3.4.1 Physical Requirements

The finished product shall contain no bone, skin, foreign material, or foreign flavors and odors.

3.4.2 Microbiological Requirements

The microbiological count and examination shall comply with Addendum No. 1D, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

3.5 Deliveries

All deliveries shall conform in every respect to the provisions of the Federal Food, Drug, and Cosmetic Act and Regulations Promulgated Thereunder.

3.6 The product shall be prepared only in an establishment which is regularly inspected by the Consumer Marketing Service, U.S.D.A. The product shall be handled and delivered under the same sanitary conditions that govern the handling and movements of similar products within and between establishments operated under U.S.D.A. inspection.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor is responsible for the performance of inspection requirements specified herein. A certificate of compliance, processing records and laboratory reports shall accompany each shipment. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of Packaged Food

If the tray or covering material contains any objectionable color, flavor, or odor which is imparted to the food, the lot shall be rejected.

4.4 Examination of Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects, dirt or foreign odor or flavor shall be cause for the rejection of the lot.

4.5 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance with 4.6. The sample unit for testing shall be a composite of the entire package. The sample size shall be 10 percent of the lot. A lot for a given procurement shall be one type of product. The lot shall be rejected if one or more test results indicate non-conformance to test requirements.

4.6 Microbiological Examination

The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1D, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

5.0 Preparation for Delivery

5.1 Packaging

5.1.1 Primary Package

The primary package shall be a plastic film or laminate which complies with 5.1.1.1 to 5.1.1.5.

5.1.1.1 Oxygen Transmission Rate

The oxygen transmission rate shall be less than 5cc/1 sq.M./24 hrs./1 ATM, (TEST METHOD ASTM D-1434).

5.1.1.2 Water Vapor Transmission Rate

The water vapor transmission rate shall be less than 1 gm/1 sq. M./24 hrs./ 1ATM, (TEST METHOD ASTM D-1434).

5.1.1.3 Closure

The package shall be heat sealed or closed with adhesives which are approved by the Consumer Marketing Service, U.S.D.A.

5.1.1.4 Clarity

The material used in the primary container shall be free of haze and distortion so that the product can be inspected visually without opening the package.

5.1.1.5 Approval of Materials

The packaging materials shall be those approved by the F.D.A. and the Consumer Marketing Service, U.S.D.A.

5.1.2 Shipping Container

The shipping container(s) shall be corrugated or solid fiberboard. The size and design of the container shall be such that the product shall not be damaged in transit. The material shall be resistant to water vapor and shall retain its strength during storage and shipment below 40°F.

5.1.2.1 Temperature During Shipment

Temperature during shipment shall not exceed 40°F. A recording thermometer shall be placed in each shipping container to monitor the temperature.

5.2 Shipping Instructions

The finished product shall be shipped to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

5.3 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance and processing records which indicate the requirements of this document have been complied with. Each package shall be labeled with Type of Product, Lot No. and date of production. This information shall be stated in the Contractor's Certificate of Compliance. The microbiological records shall also accompany the shipment.

6.0 Destination Inspection

Each shipping container shall be inspected at destination by an authorized representative of the government. This inspection shall include examination of the following:

a) Verify presence of Contractor's Certificate of Compliance

b) Verify presence of microbiological reports and verify compliance

c) Verify presence of processing records and verify compliance

d) Verify that the heat seal on each loaf is still intact

PRODUCTION GUIDE FOR DRIED APRICOTS, PEACHES AND PEARS

PRODUCTION GUIDE

FOR

DRIED APRICOTS, PEACHES AND PEARS

1.0 SCOPE

This document contains the requirements for the production of dried apricots, peaches and pears.

2.0 APPLICABLE DOCUMENTS

The following documents form a part of this Production Guide to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug, and Cosmetic Act and General Regulations for Its Enforcement.

U. S. Department of Agriculture

United States Standards for Grades of Dried Apricots

United States Standards for Grades of Dried Peaches

United States Standards for Grades of Dried Pears

Regulations Governing Inspection and Certification of Processed Fruits and Vegetables and Related Products.

3.0 REQUIREMENTS

3.1 Preproduction Sample Approval. Representative samples which the contractor proposes to furnish shall be submitted for approval before production is commenced.

3.2 Material.

3.2.1 Peaches. Either Freestone or Clingstone peaches shall be used.

3.2.2 Apricots. Blenheim, Moorpark, Royal or Tilton apricots shall be used.

3.2.3 Pears. Bartlett pears shall be used.

3.3 Preparation. All products shall be prepared from clean, sound, properly matured fruit. All fruit shall be from the latest available crop. The fresh fruits shall be blanched, halved, pitted or cored, treated with sulfur dioxide and dried. Drying shall be accomplished by sun drying or by mechanical methods.

3.4 Finished Product.

3.4.1 Physical Requirements. All of the dried fruits shall be Grade A (Fancy) and size No. 3. The products shall possess a uniform, bright color, characteristic of well-matured fruit. The products shall possess no foreign material, foreign flavors or odors.

3.4.2 Analytical Requirements.

3.4.2.1 Moisture. The finished product shall not contain more than 25 $\pm$ 5 percent by weight of moisture.

3.4.3 Microbiological.

3.4.3.1 Requirements:

See Addendum No. 1D, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

3.5 Deliveries. All deliveries shall conform in every respect to the provisions of the Federal Food, Drug, and Cosmetic Act and regulations promulgated thereunder.

3.6 The product shall be handled and delivered under the same sanitary conditions that govern the handling and movements of similar products within and between establishments operated under U.S.D.A. inspection.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection. The Contractor shall be responsible for performing the examinations and tests specified in this document. Each shipment shall be accompanied by the Contractor's Certificate of Compliance with the requirements of this document.

4.2 Testing of the Finished Product.

4.2.1 Microbiological. The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1D, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

4.2.2 Moisture. Moisture analyses shall be made in accordance with methods of the Association of Official Agriculture Chemists or any approved method.

5.0 Preparation for Delivery.

5.1 Packaging.

5.1.1 Primary Container. The primary container shall be polyethylene or any other suitable material with similar properties. The minimum thickness of the material shall be 2.0 mil.

5.1.2 Closure. The primary container shall be closed by a hot seal which shall provide an air tight seal of the package.

5.2 Shipping Container.

5.2.1 Construction

The shipping container shall be constructed of 200 lb. test, C-flute, single wall, corrugated fiberboard. The style of the container shall be a Regular Slotted Container (RSC). The dimensions of the shipping container shall be such that the dried fruit is held securely during shipment. The Uniform Freight Classification Rule 41 should also be used to determine weight restrictions and other requirements.

5.2.2 Closure. The shipping container shall be closed using two strips of 3 inch reinforced tape. Each strip shall extend 2 inches over the end of the carton.

5.3 Shipping Instructions.

The finished product shall be shipped and addressed to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas 77058

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

5.4 Contractor Certification. Each shipment shall be accompanied by the Contractor's Certificate of Compliance that indicates the requirements of this document have been complied with.

The microbiological records and data regarding the moisture content shall also be submitted with the shipment.

PRODUCTION GUIDE

FROZEN MEALS FOR INFLIGHT FOOD SYSTEM

PRODUCTION GUIDE

FROZEN MEALS FOR INFLIGHT FOOD SYSTEM

1.0 SCOPE

1.1 This Production Guide describes requirements for the processing, packaging, testing and shipment of frozen food for spacecraft food systems.

2.1 Other Publications

The following documents form a part of this Production Guide to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

Grade "A" Pasteurized Milk Ordinance - 1965.

Recommendations of the U. S. Public Health Service.

Bakery Products: Definitions and Standards of Identity.

U. S. Department of Agriculture

Regulations Governing the Meat Inspection of the U. S. Department of Agriculture.

Regulations Governing the Grading and Inspection of Poultry and Edible Products Thereof and United States Specifications of Classes, Standards, and Grades with Respect Thereto.

Regulations Governing the Grading and Inspection of Egg Products.

U. S. Standards for Grades and Weight Classes for Shell Eggs.

United States Standards for Grades of:

Beef

Fresh Peas

Topped Carrots

Asparagus (fresh)

Snap Beans

Fresh Potatoes

Fresh Onions

Frozen Green and Wax Beans

Frozen Peas

Cheddar Cheese

Butter

American Dry Milk Institute, Inc.

Standard for Grades for the Dry Milk Industry

U. S. Department of the Interior

Regulations Governing Processed Fishery Products. Bureau of Commercial Fisheries, U. S. Fish and Wildlife Service, U. S. Department of the Interior.

3.0 Requirements

3.1 Food Materials

The products to be delivered under the terms of this Contract shall be manufactured from components which comply with the regulations of the Food and Drug Administration, U. S. Department

of Health, Education and Welfare, or regulations of the Consumer Marketing Service, U. S. Department of Agriculture, or regulations of the Bureau of Commercial Fisheries, U. S. Fish and Wildlife Service, U. S. Department of the Interior. All materials shall be of edible grade, clean, sound, wholesome, and shall be free from evidence of insect infestation or other objectionable foreign matter, odors and flavors. Material shall be in excellent condition at the time of use.

3.3.1 Bread and Bakery Products

Bread and Bakery Products shall be made in accordance with Definitions and Standards of Identity for Bakery Products as set forth under the Food, Drug and Cosmetic Act.

3.3.2 Eggs and Egg Products

Eggs and egg products shall be procured from a source approved by the U. S. Department of Agriculture. Egg products shall be U. S. Grade A; fresh shell eggs shall be U. S. Grade AA.

3.3.3 Fruits and Vegetables

Fruits and vegetables; fresh, frozen, dried and canned shall be U. S. Grade No. 1 or U. S. Grade A (or U. S. Fancy) as applicable. When fruits and vegetables are used which do not have applicable U. S. Standards for grades, they shall be of best commercial grade available and shall possess good characteristic flavor, odor and color. They shall be free from quality defects.

3.3.4 Meat, Poultry and Seafood

3.3.4.1 Meat Products

All Meat Products shall be prepared and processed only in a plant which is operated under the continuous inspection of the Consumer Marketing Service, U.S.D.A., and shall be inspected, passed and marked in accordance with regulations governing the Meat Inspection of the U.S.D.A.

3.3.4.1.1 Beef

U. S. Grade Good or better beef shall be used.

3.3.4.1.2 Cured Meat Products

Curing ingredients shall be those permitted by the Consumer Marketing Service, U.S.D.A.

3.3.4.2 Poultry

Poultry shall be slaughtered and processed in a plant which is operated under the continuous inspection of the Consumer Marketing Service, U.S.D.A. Poultry shall be U. S. Grade B or better.

3.3.4.3 Fish

Fish and Seafood shall be prepared and processed in a plant which is operated under the continuous inspection of the Bureau of Commercial Fisheries, U. S. Fish and Wildlife Service, Department of the Interior.

3.3.5 Milk and Dairy Products

Milk and all dairy products shall be procured from a source approved by the U. S. Department of Agriculture. Milk shall be U. S. Grade A. Nonfat dry milk shall be extra grade. Cheese shall be U. S. Grade A or better. Butter shall be U. S. Grade AA.

3.3.6 Spices and Soluble Spice Flavors

Natural spices or soluble spice flavors shall be used. If soluble spice flavors are used, they shall be used in amounts necessary to produce the flavor equivalent of the ground natural spices. Spices and soluble spice flavors shall be clean, free-flowing, dry, good commercial grade.

3.4 Preparation and Processing of Materials

3.4.1 Vegetables

3.4.1.1 Fresh

Fresh vegetables shall be thoroughly cleaned, washed, peeled when necessary, and trimmed to remove all defective and undesirable material. Precautions shall be taken to prevent discoloration and other deterioration of the product during these operations.

3.4.1.2 Frozen

Frozen vegetables which have been sufficiently cooked prior to freezing shall meet product requirements specified in 3.2.1.3. Frozen vegetables requiring cooking shall not be defrosted before cooking.

3.4.1.3 Cooking and Filling

Cooking of the fresh and frozen products shall be accomplished in the shortest time commensurate with the attainment of a firm but tender texture, good flavor, and natural color in the end product after freezing, thawing, and reheating to a serving temperature. The cooked product shall be filled into packages and shall enter the freezer within 1 hour after cooking.

3.4.2 Meat, Fish and Poultry Products

3.4.2.1 Meat Products

All meat shall be held under refrigerated conditions, 32° - 40°F., until it is cooked. All meat shall be cooked to a tender state. The cooked meat shall be placed in the freezer within one hour after cooking. All bones, bone chips exceeding 1/4 inch in dimension, cartilage, kidneys, blood clots, blood trimmings, bruised portions, thick tendons and ligaments, calcified periosteum, abdominal tunic, udders, prefemoral, prescapular and popliteal lymph glands, dehydrated trimmings and serous membranes shall be removed and excluded from all beef products prior to cooking.

3.4.2.1.1 Beef Steak

The tenderloin muscle shall be used for the beef steak. The steak shall be cut into one inch cubes ($\pm$ 1/4 inch) after cooking.

3.4.2.1.2 Braised Beef Tips

Beef which shall be used for braised beef tips shall be cut into one inch cubes ($\pm$ 1/4 inch) before cooking.

3.4.2.1.3 Beef for Stew

Beef which shall be used in stew shall be cut into one inch cubes ($\pm$ 1/4 inch) before cooking.

3.4.2.1.4 Roast Beef

Roasts shall be cut into slices not less than 1/8 nor more than 3/8 inch thick. The roast beef shall be cut into pieces not to exceed 1 1/2 x 1 1/2 inch.

3.4.2.2 Turkey

The cooked turkey shall be cut into slices not less than 1/8 nor more than 3/8 inch thick. The sliced meat shall be cut into pieces not to exceed 1 1/2 x 1 1/2 inches. The skin shall be removed prior to slicing and only muscle from the breast shall be used.

3.4.2.3 Chicken

The cooked chicken shall be cut into cubes not to exceed one inch $\pm$ 1/4. The skin and bone shall be removed. Only muscle from the breast shall be used.

3.4.2.4 Ham and Canadian Bacon

The ham and Canadian bacon shall be cut into slices not less than 1/8 nor more than 3/8 inch thick. The sliced product shall be cut into pieces not to exceed 1 1/2 x 1 1/2 inches.

3.4.2.5 Sauces and Gravies

Batches of prepared sauces and gravies shall be held at temperatures not lower than 160°F. and holding time shall not exceed 6 hours. As an alternative to maintaining temperatures above 160°F., sauces and gravies may be rapidly cooled to a temperature not to exceed 45°F.

3.5 Menu

The contractor shall provide meals to meet delivery schedules and other requirements of this contract. The specific meals and quantity of each shall be defined by the NASA technical monitor a minimum of 15 days prior to delivery date.

Representative individual meals are described in the following paragraph. Additional meals may be incorporated into the list by NASA as required.

3.5.1 Description of Individual Meals and Portion Size

Description of Meal	Portion Size Ounces
Meal No. 1	
Cheese Omelette	4.0
Ham	3.0
Crepes Georgia	3.0
Meal No. 2	
Plain Omelette	5.0
Bacon	1.8
Crepes Normandie	3.0
Meal No. 3	
Stew	10.0 (40% meat)
Meal No. 4	
Roast Turkey	4.0
Gravy	1.0
Dressing	2.0
Peas with White Sauce	3.0
Meal No. 5	
Filet Mignon	5.0
Twice Baked Potato (not in skin)	3.0
Asparagus	2.0

	Portion Size Ounces
Meal No. 6	
Roast Beef	4.0
au gratin Potatoes	3.0
Green Beans in Mushroom Sauce	3.0
Meal No. 7	
Baked Breast of Chicken	4.0
Southern Style Gravy	1.0
Snowflake Potatoes	3.0
Carrots	2.0
Meal No. 8	
Braised Beef Tips	4.0
Duchess Potatoes	3.0
Creamed English Peas	3.0
Meal No. 9	
Cheese Omelette	5.0
Bacon	1.8
Crepes Diane	3.0
Meal No. 10	
Plain Omelette	3.0
Breakfast Steak	4.0
Crepes Normandie	3.0
Meal No. 11	
Chicken Stew	10.0 (40% meat)
Meal No. 12	
Roast Beef Hash	7.0 (60% meat)
Green Beans	3.0

	Portion Size Ounces
Meal No. 13	
Ham Steak w/Fruit Glaze	4.0
Ham Sauce	1.0
Macaroni and Cheese	3.0
Asparagus	2.0
Meal No. 14	
Beef Slices in Mushroom Gravy	4.0
Beef Gravy	1.0
Escalloped Apples	3.0
Creamed Green Peas	2.0
Meal No. 15	
Sirloin Strip Steak (in slices)	5.0
Twice Baked Potato	3.0
Peas and Carrots in White Sauce	2.0
Meal No. 16	
Lobster Newburg	5.0
Duchess Potatoes	3.0
Green Beans in Cream Sauce	2.0

3.6 Filling and Menu Assembly

The meal components as outlined in 3.5.1 shall be placed in the primary food liner L/N 12-2458-0148-C, Food Liner Set, and placed in a freezer immediately after filling. Alternatively, the components may be placed first in a mold for freezing, cooked, and subsequently placed in the primary food package. The primary food liner

shall not be dented or deformed during freezing or handling. The components shall be in intimate contact with the bottom and side surfaces. Void areas shall be eliminated. The final meal assembly shall not exceed 1 1/8 inches in height.

3.6.1 Freezing and Refrigeration

The food shall be frozen quickly at a temperature not higher than 0°F. The product temperature shall be reduced to 0°F. or below within 6 hours after entering the freezer. The cased frozen product shall be held in forced air freezer storage for 12 hours (or longer) at 0°F. or below to insure equalization of in-case temperature prior to shipment.

3.7 Finished Product

After heating to a serving temperature of 130 $\pm$ 10°F., the food shall possess a typical color, flavor and texture with no evidence of over or under cooking. No foreign material, off flavors, flavors foreign to the product, off odor, off color, or burned appearance shall be permitted. The finished product shall comply with 3.7.1 through 3.8 as applicable.

3.7.1 Meat

Cooked meat shall be free from ligaments and any tendon material which has not been tenderized during cooking. The cooked meat shall not contain any skin or surface fat. The cooked meat shall possess a typical appearance and characteristic flavor.

3.7.2 Gravies and Sauces

Gravies and sauces shall be of a smooth consistency, shall not be curdled or lumpy in appearance, and shall be of normal color for the type of gravy or sauce used.

3.7.3 Vegetables

The vegetable products shall possess good, characteristic flavor, odor and color, and a firm but tender texture.

3.7.4 Microbiological Requirements

The microbiological count shall comply with Addendum No. 1D, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

3.8 Deliveries

All deliveries shall conform in every respect to the provisions of the Federal Food, Drug, and Cosmetic Act and Regulations Promulgated Thereunder.

3.8.1 The product shall be prepared only in an establishment which is regularly inspected by the Consumer Marketing Service, U.S.D.A. The product shall be handled and delivered under the same sanitary conditions that govern the handling and movements of similar products within and between establishments operated under U.S.D.A. inspection.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor is responsible for the performance of inspection requirements specified herein.

A certificate of compliance, processing records and laboratory reports shall accompany each shipment. This information shall be provided with the acceptance data package. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of Packaged Food

If the tray or covering material contains any objectionable color, flavor, or odor which is imparted to the food the lot shall be rejected. The seal of the primary food liner shall not be broken.

4.4 Examination of Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects, dirt or foreign odor or flavor shall be cause for the rejection of the lot.

4.5 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance with 4.6. The sample unit for testing shall be a composite of the

entire contents of a tray. The sample size shall be 10 percent of the lot or at least one meal assembly. A lot for a given procurement shall contain one menu only. The lot shall be rejected if one or more test results indicate nonconformance to test requirements.

4.6 Microbiological Examination

The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1D, Space Food Prototype Production Buide, U. S. Army Natick Laboratories, Natick, Massachusetts (par. 3.7.4).

5.0 PREPARATION FOR DELIVERY

5.1 Packaging

Unless directed otherwise, the components for each meal shall be placed in a GFP rigid aluminum liner, PN: 12-2458-C148-0. The liner shall have maximum outside dimensions of 6 1/8 inches in length, 4 7/16 inches in width and 13/16 inches in depth. The filled liners shall be completely covered with a sheet of aluminum foil or other suitable material. The filled liners shall not exceed 1 1/8 inches in height.

Any materials used in trays and covers shall not impart any objectionable odors or flavors to the food.

All sealing material or adhesive shall be non-toxic and shall not impart any objectionable odors or flavors to the food.

The filled and covered tray shall be placed in a carton as specified in 5.1.2.

5.1.2 Shipping Container

Unless otherwise specified, or unless a method superior and more advantageous can be provided, the contractor shall utilize the following packaging preparation for shipments.

All corrugated fiberboard used in this package shall conform to Federal Specification PPP-B-00636. The material shall be Type CF, Class-weather resistant, Variety-SW (Grade V3C) and Variety-DW (Grade VIIC).

a) Corrugated Fiberboard Container

1) Carton size: 26" x 22" x 12 3/4" I.D.

2) Style: Center Special Slotted Container (Minor flaps meet at the middle of the carton).

3) Manufacturing Joint: Stitch

4) Material: 350# test; Single wall; "C" Flute

b) Corrugated Taped Sleeve

1) Size: 14" x 18" x 1 1/8" O.D.

2) Manufacturing Joint: 3" Tape

3) Material: 350# test; double wall; CB flute

c) Six Cell Corrugated Partition

1) Size (overall): 14" x 18" x 1 1/8"

2) Size (Cell): 7" x 6" x 1 1/8"

3) Material: 350# test, single wall C flute

d) Corrugated Sheet

1) Size: 14" x 18"

2) Material: 350# test; single wall; C flute

e) Corrugated Die Cut Sheet

1) Size: 14" x 18"

2) Material: 350# test; single wall; C flute

f) Corrugated Taped Sleeve

1) Size: 22" x 2" x 8 3/4" (O.D.)

2) Manufacturing Joint: 3" tape

3) Material: 350# test; single wall; C flute

g) Corrugated Taped Sleeve

1) Size: 14" x 2" x 8 3/4" (O.D.)

2) Manufacturing Joint: 3" tape

3) Material: 350# test; single wall; C flute

h) Styrofoam Insulation

1) Sides: 2" x 8 3/4" x 26"

2) Ends: 2" x 8 3/4" x 18"

3) Top and Bottom: 2" x 22" x 26"

5.2 Packing

Each primary meal package shall be placed in a clean plastic container and sealed prior to placing in the fiberboard shipping container described in 5.1.2. A temperature recorder shall be placed in each shipping container. (Note: This will necessitate the removal of one of the food containers). The top flaps of the container shall be closed by taping. Taping of the top flaps shall be accomplished by applying the tape securely along the full length of all edges of the flaps. The tape shall comply with PPP-T-76 and shall have a minimum width of 2 inches.

5.2.1 Temperature Recorder

A temperature recorder shall be placed in each shipping container. The recorder shall be capable of measuring and recording the temperature within a range of - 10°F. to 40°F. The thawing indicator shall be non-toxic and shall not impart any objectionable odor or flavor to the foods.

5.3 Labeling and Marking

5.3.1 Shipping Container

Each shipping container shall contain the name and address of the consignee. Shipping instructions shall be provided by NASA prior to each shipment. Also, the following statement regarding storage conditions shall be included in the outside labeling:

Frozen Foods

Perishable

Lettering on the shipping container shall be a minimum of 1 inch in height.

5.4 Shipping

5.4.1 Preparation for Shipping

The shipping containers shall be packed with dry ice. The temperature during shipment shall not exceed 0°F.

PRODUCTION GUIDE FOR PECANS

PECANS

1.0 Scope

1.1 This document describes the requirements for the production, packaging, testing and delivery of pecans for aerospace feeding systems.

2.0 Applicable Documents

The following documents form a part of this specification to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

U. S. Department of Agriculture

U. S. Standards for Grades of Pecans (In the Shell).

3.0 Requirements

3.1 Materials

Only inshell pecans of the Desirable variety shall be used. The shells shall be intact and shall not be crushed or cracked.

3.1.1 Grade

The U.S.D.A. grade shall be No. 1.

3.1.2 Nuts Per Pound

The number of nuts in one pound shall not exceed 40.

3.1.3 Kernel Percentage

The kernel percentage shall be at least 55 percent or greater.

3.1.4 Percent Fill

The fill shall be 100 percent.

3.1.5 Kernel Quality Index

The kernel quality index shall be 100 percent.

3.2 Processing

3.2.1 Washing

The inshell pecans shall be washed with water having a temperature of 140-150°F.

3.2.2 Chlorine Rinse

After the washing procedure, the inshell pecans shall be immersed 10-15 seconds in a 2000 ppm chlorine solution. The pecan shells shall be cracked immediately after the chlorine rinse.

3.2.3 Shell Cracking

The equipment or utensils used to crack the shell shall be cleansed with a detergent-water solution. The equipment shall be rinsed with a 200 ppm chlorine solution. The shell shall be cracked and the contents removed and packaged.

3.3 Finished Product

3.3.1 Microbiological Requirements

The microbiological count shall comply with Addendum No. 1E, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts. The yeast and mold count in the finished product shall not exceed 50 per gram.

3.3.2 Appearance

The finished product shall not contain any shell, glass, metal, wood or foreign material. The kernels shall not be withered or black in color.

3.3.3 Deliveries

All deliveries shall conform in every respect to the provisions of the Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor is responsible for the performance of inspection requirements specified herein. A certificate of compliance, and laboratory reports shall accompany each shipment. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the requirements contained herein shall be cause for rejection of the finished product made therefrom.

4.3 Examination of Finished Product

The presence of foreign material, e.g., metal, wood, glass, insects, dirt or foreign flavor or odor shall be cause for rejection of the entire lot.

4.4 Sampling Procedure and Acceptance Criteria for Testing of the Finished Product

Procedures for microbiological examinations shall be in accordance with 4.5. The sample size shall be 10 percent of the lot. (If there are fewer than 10 packages, at least one package shall be examined). The lot shall be rejected if one or more of the test results indicate nonconformance to test requirements.

4.5 Tests

4.5.1 Microbiological

The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1E, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

4.5.2 Yeast and Mold

The yeast and mold count shall be performed in accordance with the Standard Methods for the Examination of Dairy Products.

5.0 Preparation for Delivery

5.1 Packaging

5.1.1 Primary Package (Interim Packaging)

The product shall be flushed with nitrogen and vacuum packaged either in a tin plate can or a flexible pouch made from a laminate of 3 mil polyethylene/.35 mil aluminum/.75 mil polyester during shipment or until it is packaged in an inflight container. The product may also be packaged in the inflight container, omitting the interim package.

5.1.2 Packaging Methods

If a tin plate can is used, the can and lid shall be steam sterilized immediately before packing. The sterile can shall be sealed under vacuum and inert atmosphere.

When the flexible pouch is used, the pouches shall be sealed in a porous paper with a latex sealing medium and autoclaved at 15 pounds pressure for at least 15 minutes.

5.1.3 Packing for Shipment

The shipping container shall be a corrugated container which meets or exceeds all provisions of the Uniform Freight Classification and the Motor Freight Classification. Sufficient cushioning material shall be used to protect the primary containers from crushing or puncture.

5.2 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance and records which indicate that the requirements of this document have been complied with. The contents, lot number, quantity and date of production shall also be indicated on each container and the appropriate shipping documents.

PRODUCTION GUIDE FOR CANNED PEACHES AND MIXED FRUIT

CANNED PEACHES AND MIXED FRUIT

1.0 Scope

1.1 This document describes the requirements for the production, packaging and shipment of canned fruit for aerospace feeding systems.

1.2 Classification

1.2.1 The products shall be of the types listed below:

Type I - Diced Peaches

Type II - Mixed Fruit

2.0 Applicable Documents

2.1 The following documents form a part of this specification to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

Military

MIL-STD-668 Sanitary Standards for Food Plants

3.0 Requirements

3.1 Materials

The product shall be produced from fruits which comply with the regulations of the Food and Drug Administration. All fruits used shall be of edible grade, clean, sound, wholesome. They shall possess good characteristic flavor, odor and color, and shall be free from quality defects.

3.1.1 Type I

Clingstone peaches shall be used.

3.1.2 Type II

The mixed fruit shall contain peaches, pears and pineapple.

3.1.3 Syrup

A heavy syrup containing approximately 75% sucrose and 25% dextrose at a cut-out concentration of 18-22% soluble solids by Refractive Index (R.I.) in diced peaches and 18-21% soluble solids in mixed fruit shall be used.

3.1.4 Ascorbic Acid

Ascorbic acid may be used.

3.2 Preparation

3.2.1 Processing

All fruits shall be diced, blended with other ingredients, filled into cans, sealed and thermally processed in accordance with standard industrial procedures insuring commercial sterility.

3.3 Finished Product

3.3.1 Sterility Requirements

The total aerobic plate count shall be negative in one gram of product.

3.3.2 Flavor and Appearance

The finished product shall be free of objectionable odors and flavors. There shall be no unpeeled peaches, scab, blemish or discoloration.

3.4 Processing Plant

The product shall be processed in establishments meeting the sanitary requirements of MIL-STD-668.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor shall be responsible for performing the examination and tests specified in this document. Each shipment shall be accompanied by the Contractor's Certificate of Compliance indicating compliance with requirements stipulated in this document. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be the cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odors or flavor shall be cause for rejection of the entire lot.

4.3 Examination of the Finished Product

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.4 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance

with 4.5. The sample unit for testing shall be a composite of the entire package. The sample size shall be 10 percent of the lot. A lot for a given procurement shall be one type of product. The lot shall be rejected if one or more test results indicate non-conformance to test requirements.

4.5 Microbiological Examination

Total aerobic plate count shall be determined according to the Agar Plate Method, as outlined in the Standard Methods for the Examination of Dairy Products.

5.0 Preparation for Delivery

5.1 Packaging

5.1.1 Primary Container

The primary container shall be a 208 x 207 metal can with a full panel removable top. The interior of the tinplate components shall be coated with an acrylic type enamel. The interior of the "easy open" end shall be coated with an epoxy type enamel.

5.1.2 Labeling

The product shall be submitted in unmarked cans with only the production code stamped on the bottom.

5.1.3 Packing for Shipment

The shipping container shall be a corrugated container which meets or exceeds all provisions of the Uniform Freight Classification and the Motor Freight Classification. Wooden containers may be used. The contents shall be indicated on the shipping container.

5.2 Shipping Instructions

The finished product shall be shipped to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

5.3 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance that indicates the requirements of this document have been complied with. The microbiological records shall also accompany the shipment.

6.0 Destination Inspection

Each shipping container shall be inspected at destination by an authorized representative of the government. The inspection shall include examination of the following:

a) Verify presence of Contractor's Certificate of Compliance.

b) Verify presence of microbiological reports and verify compliance.

PRODUCTION GUIDE FOR BEEF JERKY

Production Guide No. T.I.-013

BEEF JERKY

1.0 Scope

This document contains the requirements for the production of beef jerky.

2.0 Applicable Documents

The following documents form a part of this specification to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

U. S. Department of Agriculture

Regulations Governing the Meat Inspection of the United States Department of Agriculture.

Military

MIL-STD-668 Sanitary Standards for Food Plants.

3.0 Requirements

3.1 Materials

The products shall be manufactured from components which comply with the regulations of the Food and Drug Administration, U. S. Department of Health, Education and Welfare, or regulations of the Meat Inspection Division, U. S. Department of Agriculture. All materials shall be of edible grade, clean, sound, wholesome and shall be free from objectionable foreign matter, odors and flavors. Materials shall be in excellent conditions at time of use.

3.1.1 Beef

One hundred percent beef which is trimmed free of fat, heavy sinews, cartilage and bone shall be used. Beef shall be prepared and processed only in a plant which is operated under the continuous inspection of the Consumer Marketing Service, United States Department of Agriculture (U.S.D.A.).

3.1.2 Curing Ingredients

Curing ingredients shall be those permitted by the Consumer Marketing Service, U.S.D.A.

3.1.3 Additives

Additives shall be those approved by the Consumer Marketing Service, U.S.D.A.

3.2 Processing

3.2.1 Grinding and Mixing

The trimmed meat shall be ground, then chopped. During the grinding, the meat components shall be thoroughly cured with a well-blended mixture of fine salt and sugar with the permissible nitrates and nitrites used in any combination permitted by the Consumer Marketing Service, U.S.D.A.

3.2.2 Extruding and Smoking

The meat shall be extruded into ribbons and smoked in a smoke oven for approximately six to eight hours, then dried. After smoking, the product shall be analyzed for moisture and salt until a brine content of about 18% is obtained.

3.3 Finished Product

3.3.1 Physical Requirement

The finished product shall contain no bone, skin, foreign material, or foreign odors and flavors.

3.3.2 Salt/Water Ratio

The minimum salt/water ratio shall be 1 to 5.

3.3.2 Microbiological Requirements

The microbiological count and examination shall comply with Addendum No. 1E, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

3.4 Processing Plant

The product shall be processed in establishments meeting the sanitary requirements of MIL-STD-668. The processing plant shall also be inspected regularly by the Consumer Marketing Service, U.S.D.A.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor is responsible for the performance of inspection requirements specified herein. A certificate of compliance, processing records and laboratory reports shall accompany each shipment. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, hair, dirt, insect, paper, wood or other extraneous material, or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of Finished Product

Presence of foreign material, e.g.glass, wood, metal, hair, dust, insects, paper, wood, glass, metal particle, or other extraneous material, or foreign odor or flavor shall be cause for rejection of the entire lot.

4.4 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance with 4.5. The sample size shall be 10 percent of the lot purchased by the National Aeronautics and Space Administration. The lot shall be rejected if one or more test results indicate non-conformance to test requirements.

4.5 Microbiological Examination

The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1E, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

4.6 Chemical Examination

Chemical analysis for moisture and salt shall be made in accordance with Official Methods of Analysis of the Association of Official Agricultural Chemists, Chapter: Meat and Meat Products, Section: Meat.

5.0 Preparation for Delivery

5.1 Packaging

5.1.1 Primary Package

The primary package shall be a plastic film or laminate which complies with 5.1.1.1 and 5.1.1.2.

5.1.1.1 Oxygen Transmission Rate

The oxygen transmission rate shall be less than 5cc/1 sq.M./24 hrs./1 ATM, (TEST METHOD ASTM D-1434).

5.1.1.2 Water Vapor Transmission Rate

The water vapor transmission rate shall be less than 1 gm/1 sq.M./24 hrs./ 1 ATM, (TEST METHOD ASTM D-1434).

5.2 Shipping Container

The shipping container(s) shall be corrugated or solid fiberboard. The size and design of the container shall be such that the product shall not be damaged in transit. The material shall be resistant to water vapor and shall retain its strength during storage and shipment.

5.3 Shipping Instructions

The finished product shall be shipped to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

5.4 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance that indicates the requirements of this document have been complied with. The microbiological records and data regarding the moisture and salt content shall also be submitted with the shipment.

PRODUCTION GUIDE FOR PUDDING

PUDDING

1.0 Scope

1.1 This document describes the requirements for the production, packaging and shipment of pudding for aerospace feeding systems.

1.2 Classification

1.2.1 Products shall be of the type listed below:

Type I - Vanilla

Type II - Lemon

Type III - Butterscotch

Type IV - Banana

Type V - Chocolate

Type VI - Chocolate Fudge

2.0 Applicable Documents

2.1 The following documents form a part of this production guide to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

Military

MIL-STD-668 Sanitary Standards for Food Plants

3.0 Requirements

3.1 Materials

The products shall be manufactured from components which comply with the regulations of the Food and Drug Administration, U. S. Department of

Health, Education and Welfare. All materials shall be of edible grade, clean, sound, wholesome and shall be free from evidence of insect infestation or other objectionable foreign matter, odors and flavors. They shall be in excellent condition at the time of use.

3.1.1 Milk Products

Skim milk, regular (fluid single strength), condensed (not to exceed 32% solids) or extra grade spray dried nonfat dry milk shall be used.

3.1.2 Sugar

Sugar may be liquid or granulated sucrose. Corn syrup solids may be used as an optional ingredient.

3.1.3 Starch

Modified food starch products may be used.

3.1.4 Vegetable Oil

Hydrogenated vegetable oil shall be used.

3.1.5 Stabilizers and Emulsifiers

Stabilizers and emulsifiers which are used shall be those approved by the Food and Drug Administration.

3.1.6 Flavoring Ingredients

Flavor ingredients, natural or artificial shall be those approved by the Food and Drug Administration.

3.1.7 Color Ingredients

Artificial coloring agents, approved by the Food and Drug Administration, may be used.

3.1.8 Salt

Salt shall be non-iodized white, refined, sodium chloride of food grade quality.

3.1.9 Chocolate and Cocoa

Chocolate and cocoa products shall meet the requirements of the Definitions and Standards of Identity for Cocoa Products of the Federal Food, Drug and Cosmetic Act.

3.1.10 Water

Water used in the preparation of products specified herein shall be of a safe sanitary quality and approved by State or Federal Authorities.

3.1.11 Optional Ingredients

Approved antioxidants may be used as optional ingredients.

3.2 Preparation

3.2.1 Processing

The ingredients shall be blended together, thermally processed and aseptically canned.

3.3 Finished Product

3.3.1 Composition

The composition of the finished product shall comply with the following:

Percent Moisture (by weight)	66.0 - 72.0
Percent Fat (by weight)	3.5 - 4.5
Percent Protein (by weight)	1.75 - 3.5

3.3.2 Sterility Requirements

The finished product, packaged in the containers specified in 5.1.1, shall show no signs of gas production or spoilage when stored for 14 days at 35°C. The microbiological examination of the incubated samples shall be negative.

3.3.3 Texture and Flavor

The finished product shall have a smooth texture and shall be free of lumps. The product shall be free of objectional odors and flavors.

3.4 Processing Plant

The product shall be processed in establishments meeting the sanitary requirements of MIL-STD-668.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor is responsible for the performance of inspection requirements specified herein. Each shipment shall be accompanied by the Contractor's Certificate of Compliance indicating compliance with requirements stipulated in this document. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of the Finished Product

Presence of foreign material, e.g, metal, wood, glass, insects, dirt, lumps or foreign odor or flavor shall be cause for rejection of the entire lot.

4.4 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological and chemical examinations shall be in accordance with 4.5 and 4.6. The sample size shall be 10 percent of the units (cans) purchased by the National Aeronautics and Space Administration, Manned Spacecraft Center (NASA-MSC).

4.5 Examination for Sterility

Ten percent of the units shall be incubated at 35°C for 14 days. Following the incubation period, the product shall be examined according to the procedures outlined in paragraph 4.5.1. The lot shall be rejected if there is a positive count or if the incubated samples show evidence of gas production or spoilage.

4.5.1 Sterility Determination

Following the can incubation period the samples to be tested are plated as follows:

a. The top of the can is covered with isopropyl alcohol which is then burned off. The top is then flamed with a gas burner particularly in the tab area.

b. To prevent burned fingers, a metal rod is inserted through the ring pull and the top is pulled back approximately half-way exposing the

pudding. A sterile stirring rod is inserted into the can and the contents stirred until thoroughly mixed.

c. An inoculating needle is first flamed and then inserted approximately 1/4" into the pudding adhering to the stirring rod.

d. The pudding is removed from the inoculating needle by swirling the needle in a 16 mm culture test tube containing 10.0 ml of melted "DIFCO" plate count agar held in a constant temperature water bath at 45°C. The tubes are then placed on a "Vortex" type mixer until the pudding is sufficiently mixed with the agar.

e. The contents of the culture tube are then poured into a sterile petri dish.

f. After the agar has solidified at room temperature, the petri dishes are incubated for 48 hours at 35°C in an inverted position.

g. At the end of the incubation period the plates are read for positive or negative counts only.

4.5.1.1 Media Preparation

a. Mixing - Follow instructions printed on the bottle of dry plate count agar. However, instead of the dry powder being suspended in cold distilled water, substitute a 0.1% (1 ml per liter) solution of Triton X-100 for the same liquid volume.

b. Dispense 10.0 ml of the rehydrated agar in the 16 mm culture test tubes and cap.

c. Autoclave the filled and capped test tubes for 15.0 minutes at 15.0 pounds pressure (121°C).

d. Cool the tubed agar and hold in a 45°C constant temperature water bath until used.

e. Storage temperature of the unused media must not exceed 80°F.

f. Sterilize the glass stirring rods by autoclaving for 30.0 minutes at 15.0 pounds pressure (121°C). A convenient container is a glass beaker that can be covered with aluminum foil before autoclaving.

4.5.1.2 Interpretation of Results

Following the 48 hour incubation petri dishes should be examined for microbial colonies on the darkfield colony counter.

a. No colony growth in the agar constitutes a negative test and indicates sterility of operations.

b. The presence of microbial colonies on a plate necessitates a subsequent resampling and replating of four cans from the same production code.

1. If none of the plates from the four cans then have no colony growth sterility of the production code is indicated.

2. If colony growth is found in any of the four plates the test must be reported as positive for lack of sterility.

c. Spreading growth on the surface of the agar plate without actual colonies also indicates contamination and the plating procedure must be repeated.

4.6 Composition Analysis

Analytical determinations shall be made in accordance with the following methods from the Official Methods of Analysis of the Association of Official Agricultural Chemists or other methods approved by NASA-MSC.

Test	Method	Section	Chapter
Moisture	Vacuum	Meat	Meat & Meat Products
Fat	Roese Gottlieb	Ice Cream & Frozen Desserts	Dairy Products
Protein	Nitrogen	Ice Cream & Frozen Desserts	Dairy Products

5.0 Preparation for Delivery

5.1 Packaging

5.1.1 Primary Container

The primary container shall be a 208 x 203 drawn aluminum container. The interior shall be vinyl coated and the lid shall be a full panel removable type.

5.1.2 Labeling

The primary container shall not be labeled, except for the code which shall be placed on the bottom of each container.

5.1.3 Shipping Container

The shipping container(s) shall be corrugated or solid fiberboard. Wooden containers may also be used. The size and design of the container shall be such that the container nor the product shall not be damaged in transit. The material shall be resistant to water vapor and shall retain its

PRODUCTION GUIDE FOR CHOCOLATE CANDY BARS

CHOCOLATE CANDY BARS

1.0 Scope

1.1 This document describes the requirements for the production, packaging, and shipment of chocolate candy for aerospace feeding systems.

1.2 Classification

Type I - without almonds

Type II - with almonds

2.0 Applicable Documents

2.1 The following documents form a part of this specification to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

Standards, Military

MIL-STD-668 Sanitary Standards for Food Plants

National Aeronautics and Space Administration

Addendum No. 1E, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts

3.0 Requirements

3.1 The products shall be manufactured from components which comply with the regulations of the Food and Drug Administration. All materials shall be of edible grade, clean, sound, wholesome and shall be free from evidence of insect infestation or other objectionable foreign matter, odors and flavors. They shall be in excellent condition at time of use.

3.1.1 Almonds

Almonds shall be well-dried, fumigated, and properly cleaned, and shall be free from rancidity, mold, bird or insect damage, decay, worm injury, and damage caused by shriveling. Diced almond pieces shall be used.

3.1.2 Antioxidant

Antioxidants approved by the Food and Drug Administration may be added as optional ingredients.

3.1.3 Chocolate Liquor

Chocolate liquor shall conform to the Standards of Identity of the Food and Drug Administration except that it shall be manufactured from domestically roasted cocoa beans equal to or better in quality than fair, fermented Accra; fair, average quality Lagos; or superior Babia. If superior Babia beans are used, they shall be limited to not more than 50 percent of the blend. A maximum of 15 percent Sachez, Midcrop Lagos, Midcrop Accra, or Ivory Coast may be used in the blend. The fat content of the finished liquor shall be 54 $\pm$ 2.0 percent. Cocoa nibs shall not be alkali processed.

3.1.4 Emulsifiers

Sorbitan monostearate, polyoxyethylene 20 sorbitan monostearate or lecithin shall be used.

3.1.5 Fat

Vegetable fat shall be natural or hydrogenated coconut, palm kennel, babasu tucum or other tucum, or other high lauric acid oils or mixtures thereof, or a mixture of one or more of these with not more than 25 percent of all

hydrogenated peanut oil or cottonseed oil, or both combined. The melting point of the added fat shall be $113^{\circ} \pm 2^{\circ}F$.

3.1.6 Nonfat Dry Milk

Nonfat dry milk shall be U. S. extra grade.

3.1.7 Salt

Salt shall be white, refined sodium chloride with or without anticaking agents. Iodized salt shall not be used.

3.1.8 Sugar

Unless otherwise specified, the term "sugar" shall apply only to granulated or powdered cane or beet sugar, liquid sugar (noninvert type) or any combination of these.

3.1.9 Vanillin

Vanillin shall be used as a flavoring agent.

3.1.10 Artificial Flavors

Artificial flavors, approved by the Food and Drug Administration, may be used as optional ingredients.

3.1.11 Vitamins

Thiamine hydrochloride, ascorbic acid and vitamin A may be added as optional ingredients.

3.2 Finished Product

The finished product shall be free from objectionable tastes, odors, foreign material, and insect infestation. The paper, adhesives, and other material used in wrapping or packaging the finished material, shall impart no odor or flavor to the product.

3.3 Microbiological Requirements

The microbiological count and examination shall comply with Addendum No. 1E, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

3.4 Processing Plant

The product shall be processed in establishments meeting the requirements of MIL-STD-668.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor is responsible for the performance of inspection requirements specified herein. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odors or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of Packaged Food

If the packaging materials contain any objectionable color, flavor, or odor which is imparted to the food, the lot shall be rejected.

4.4 Examination of Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects, dirt or foreign odor or flavor shall be cause for the rejection of the lot.

4.5 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance with 4.6. The sample unit for testing shall be a composite of the entire contents of a package. The sample size shall be 10 percent of the lot. The lot shall be rejected if one or more test results indicate nonconformance to test requirements.

4.6 Testing of Finished Product

4.6.1 Microbiological Examination

The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1E, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

5.0 Preparation for Delivery

5.1 Packaging

5.1.1 Primary Package Material

The material used for the primary container shall be an unsupported plastic film or laminate or composite structure with the following restrictions:

1. Water Vapor Transmission Rate > 8 gms/24 hrs/ 1 sq M
   By ASTM E-96 Method E
2. Oxygen Transmission Rate > 30cc/24 hrs/ 1 sq M/1 ATM
   By ASTM D-1434
3. Heat seal characteristics must rate as very good to excellent relative to other commonly used films.

4. Material must be approved by the Food and Drug Administration for food use.

5. Material must not impart any flavor or taste to the food product.

6. Vinyl base films shall not be used with the exception of a saran polymer coating on a substrate metal. Cellophane shall not be used for the primary packaging material.

5.1.2 Primary Container Construction

The primary container shall be a flat bag, sealed on four sides with a seal not less than 0.25 inches in width. The external dimensions shall be no greater than necessary to contain and properly package the product. The package shall be closed with an internal pressure not greater than 2 psia.

5.1.3 Primary Container Labeling

The primary container shall not be labeled. All identification shall be contained in documents accompanying the shipment.

5.2 Shipping Container

The shipping container shall be so designed as to protect the product from all intransit damage.

5.3 Shipping Instructions

The finished product shall be shipped to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

5.4 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance that indicates the requirements of this document have been complied with. The microbiological records shall also be submitted with the shipment.

6.0 Destination Inspection

Each shipping container shall be inspected at destination by an authorized representative of the government. The inspection shall include examination of the following:

1. Verify presence of Contractor's Certificate of Compliance
2. Verify presence of microbiological reports and verify compliance
3. Verify that the following information is included with the shipment:
   a. Product type
   b. Date of production
   c. Place of production
   d. Production Lot Number
   e. Number of items in the shipment

PRODUCTION GUIDE – FRUIT BARS

PRODUCTION GUIDE

FRUIT BARS

1.0 SCOPE

1.1 This document describes the requirements for the production, packaging and shipment of fruit bars for aerospace feeding systems.

1.2 Classification

1.2.1 The products shall be of the types listed below:

Type I - Apricot Bars

Type II - Strawberry Bars

Type III - Raspberry Bars

Type IV - Sliced Apple Bars

2.0 APPLICABLE DOCUMENTS

2.1 The following documents form a part of this specification to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

Military

MIL-STD-668 Sanitary Standards for Food Plants

3.0 REQUIREMENTS

3.1 Materials

The product shall be produced from fruits which comply with the regulations of the Food and Drug Administration. All fruits used shall be of edible grade, clean, sound and wholesome. They shall possess good characteristic flavor, odor and color, and shall be free from quality defects.

3.1.1 Type I

Dried California apricots shall be used.

3.1.2 Type II

High quality strawberries shall be used. Apricots and dried apple powder may also be used as ingredients.

3.1.3 Type III

High quality raspberries shall be used. Apricots and dried apple powder may also be used as ingredients.

3.1.4 Type IV

High quality sliced dried apples shall be used. Apricots and dried apple powder may also be used.

3.1.5 Sugar

Fine granulated sucrose and corn syrup solids with a dextrose equivalent of 42 shall be used. Corn syrup solids with a dextrose equivalent of 24 may also be used.

3.1.6 Citric Acid

Citric acid shall be anhydrous U.S.P. grade.

3.1.7 Ascorbic Acid

Ascorbic acid may be used.

3.1.8 Artificial Color

Artificial colors which are approved by the Food and Drug Administration may be used.

3.2 Preparation

3.2.1 Processing

The ingredients shall be homogenized, spread in thin layers and dried and laminated in layers to 1/4 inch thick and cut in bars 9 inches x 1 inch.

3.3 Finished Product

3.3.1 The finished product shall be free of objectionable odors and flavors. The moisture content of the product shall be 12.0 percent $\pm$ 1.0 percent.

3.4 Processing Plant

The product shall be processed in establishments meeting the sanitary requirements of MIL-STD-668.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor shall be responsible for performing the examination and tests specified in this document. Each shipment shall be accompanied by the Contractor's Certificate of Compliance indicating compliance with requirements stipulated in this document. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be the cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of the Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects, dirt or foreign odors or flavor shall be cause for rejection of the entire lot.

4.4 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance with 4.5. The sample unit for testing shall be a composite of the entire package. The sample size shall be 10 percent of the lot. A lot for a given procurement shall be one type of product. The lot shall be rejected if one or more test results indicate non-conformance to test requirements.

4.5 Microbiological Examination

Microbiological examination shall be conducted in accordance with Addendum 1E Microbiological Requirements for Space Food Prototypes, U. S. Army Natick Laboratories, Natick, Massachusetts.

4.6 Moisture Determination

Moisture content shall be determined in accordance with 20.009, Chapter 20 "Fruits and Fruit Products" in the official Methods of Analysis of the Association of Official Agricultural Chemists, 10th ed.

5.0 PREPARATION FOR DELIVERY

5.1 Packaging

5.1.1 Primary Wrap

Each bar shall be tightly wrapped in saran coated cellophane or another film with equivalent moisture barrier properties. The primary wrap can be sealed with heat or pressure sensitive tape. Any material used in the primary wrap shall be F.D.A. approved for food use.

5.1.2 Secondary Wrap

Six wrapped bars shall be overwrapped with saran or equivalent film. Pressure sensitive tape shall be used to secure the closure of the secondary wrap. Material used for the secondary wrap shall be F.D.A. approved for food use.

5.1.3 Packing for Shipment

The shipping container shall be corrugated container which meets or exceeds all provisions of the Uniform Freight Classification. Wooden containers may be used. The contents shall be indicated on the shipping container.

5.2 Shipping Instructions

The finished product shall be shipped to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas 77058

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

5.3 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance that indicates the requirements of this document have been complied with. The microbiological records shall also accompany the shipment.

6.0 DESTINATION INSPECTION

Each shipping container shall be inspected at destination by an authorized representative of the government. The inspection shall include examination of the following:

a) Verify presence of Contractor's Certificate of Compliance.

b) Verify presence of microbiological reports and verify compliance.

c) Verify package integrity.

PRODUCTION GUIDE

EDIBLE AMYLOMAIZE STARCH PACKAGING FILM

Edible Amylomaize Starch Packaging Film

1.0 Scope

1.1 This document describes the requirements for the production, packaging, and shipment of edible starch films which will be used to package fruit bars for aerospace feeding systems.

2.0 Applicable Documents

2.1 The following documents form a part of this document to the extent specified herein:

U.S. Department of Health, Education, and Welfare
Federal Food, Drug and Cosmetic Act and Regulations
Promalgated Thereunder.

3.0 Requirements

3.1 Materials

The products shall be manufactured from components which comply with the regulations of the Food and Drug Admnnistration. All materials shall be of edible grade, clean, sound, wholesome and shall be free from evidence of insect infestation or other objectionable foreign matter, odors, or flavors.

3.2 Finished Product

The finished product shall be free from objectionable tastes, odors, foreign material, and insect infestation. The paper, adhesives, and other materials used in wrapping or packaging the finished material, shall impart no odor or flavor to the product.

3.3 Physical Properties

The finished product shall have the following properties (Measured @ 22°C, 50% R.H.):

Yield (in 2/16./Mil)	21,000
Tensile Yield (psi)	
MD	1,800
TD	1,200
Tensile Break (psi)	
MD	1,300
TD	1,200
Tensile Elongation (%)	75
Gas Transmission Rates ($CC/Mil/100in^2/24hrs/atm.$)	
Gas	
O_2	1.6
Co_2	5.7

3.4 Microbiological Requirements

The microbiological count and examination shall comply with Addendum No. E, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick Massachusetts.

3.5 Processing Plant

The product shall be processed in establishments meeting the requirements of MIL-STD-668.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor is responsible for the performance of inspection requirements specified herein. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be asxertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be cause for rejection of the finished product made therefrom.

4.3 Foreign Material

Presence of foreign, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.4 Examination of Packaged Film

If the packaging materials contain any objectional color, flavor, or odor which is imparted to the edible film, the lot shall be rejected.

4.5 Examination of Finished Product

Presence of foreign material, e.g., metal , wood, glass, insects, dirt or foreign odor or flavor shall be cause for the rejection of the lot.

4.5.1 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance with 4.6. The sample size shall be 10 percent (by weight) of the lot (a lot is defined as the total amount procured). The lot shall be rejected if one or more test results indicate nonconformance to test requirments.

4.6 Testing of Finished Product

4.6.1 Microbiological Examination

The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1E, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

4.6.2 Tensile Test

The finished product shall be tested according to ASTM D-882 to determine tensile yield, break, and elongation.

4.6.3 Gas Transmission Rate

Gas transmission rate of the finished product shall be determined by ASTM Test D-1432.

5.0 Preparation for Delivery

5.1 Packaging

5.1.1 Primary Package Material

The material used for the primary package shall be an unsupported plastic film, laminate, or composite structure with the following restriction:

(1) Water Vapor Transmission Rate:
8 gms/24hrs/1sq^{M}
By ASTM #-96 Method E

(2) Heat seal characteristics must rate as very good to excellent relative to other commonly used films.

(3) Material must be approved by the Food and Drug Administration for food use.

(4) Material must not impart any flavor or taste to the food product.

(5) Vinyl base films shall not be used with the exception of a saran polymer coating on a substrate metal. Cellophane shall not be used for the primary packaging material.

5.1.2 Primary Container Construction

The primary container shall be a flat bag, sealed on four sides with a seal not less than 0.25 inches in width. The external dimensions shall be no greater than necessary to contain and properly package

the product.

5.1.3 Primary Container Labeling

The primary container shall not be labeled. All identification shall be contained in documents accompanying the shipment.

5.1.4 Shipping Container

The shipping container shall be so designed as to protect the product from all intransit damage.

5.2 Shipping Instructions

The finished product shall be shipped to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas 77058

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

6.0 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance that indicates the requirements of this document have been complied with. The microbiological records shall also be submitted with the shipment.

7.0 Destination Inspection

Each shipping container shall be inspected at destination by an authorized representative of the government. The inspection shall include examination of the following:

1. Verify presence of Conractor's Certificate of Compliance.
2. Verify presence of microbiological reports and verify compliance.
3. Verify that the following information is included with the shipment.
    a. Product type.
    b. Date of production
    c. Place of production.
    d. Production Lot Number.
    e. Amount of material in the shipment.

PRODUCTION GUIDE - FREEZE DRIED SOUPS

PRODUCTION GUIDE

FREEZE-DRIED SOUPS

1.0 SCOPE

1.1 This document describes the requirements for processing, packaging, testing and shipment of freeze-dried soups for use in aerospace feeding systems.

1.2 Classification

1.2.1 Soup shall be of the type listed below:

Type I - Romaine

Type II - Crab Mushroom

Type III - Seafood Bisque

Type IV - Sea Scallop Bisque

2.0 Applicable Documents

2.1 The following documents form a part of this specification to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

U. S. Department of Agriculture

U. S. Standards for Grades of Butter

U. S. Standards for Grades of Dry Whole Milk

U. S. Standards for Grades of Spinach

U. S. Standards for Grades of Carrots

3.0 Requirements

3.1 Materials:

The products shall be manufactured from components which comply with the regulations of the Food and Drug Administration,

U. S. Department of Health, Education and Welfare or regulations of the U.S. Department of Agriculture. All materials shall be of edible grade, clean, sound, wholesome, and shall be free from evidence of insect infestation or objectionable foreign matter, odors and flavors. Material shall be in excellent condition at the time of use.

3.1.1 Whole Dry Milk

Whole dry milk shall be extra grade.

3.1.2 Starch

Starch shall be modified or pure tapioca or waxy maise.

3.1.3 Mushrooms

Mushrooms shall be U. S. No. 1 or Grade A and may be fresh, dried or canned.

3.1.4 Monosodium Glutamate

Food grade monosodium glutamate shall be used.

3.1.5 Salt

Salt shall be noniodized sodium chloride.

3.1.6 Butter

Butter shall be grade A or better.

3.1.7 Sugar

One or more of the following sugars may be used: sucrose (liquid or granulated), lactose, invert sugar, dextrose, or corn syrup solids.

3.1.8 Spinach

Spinach shall be U. S. No. 1, Grade A and may be fresh, frozen or canned.

3.1.9 Carrots

Carrots shall be U. S. No. 1 Grade A and may be fresh, frozen or canned.

3.1.10 Garlic

Fresh garlic, powdered garlic or garlic salt may be used.

3.1.11 Tomato Paste

Canned paste shall be used.

3.1.12 Onions

Dried onion powder or dried chopped onion shall be used.

3.1.13 Spices

Spices approved for food use shall be used.

3.1.14 Food Coloring

Only food grade colors shall be used.

3.1.15 Hydrolyzed Plant Protein

Hydrolyzed plant protein, derived from corn or soy bean protein shall be used.

3.1.16 Swiss Cheese

Cheese shall be pasteurized processed cheese (Swiss or Gruyere).

3.1.17 Vegetable Oil

Unhydrogenated or hydrogenated cottonseed, peanut or corn oils shall be used.

3.1.18 Wine

Sherry or Sauterne wine shall be used.

3.1.19 Chicken Fat

Chicken fat shall be freshly prepared. It shall be stored under

refrigerated conditions (less than 4.44°C) prior to use.

3.1.20 Vinegar

Vinegar shall be food grade.

3.1.21 Basil Leaves and Herbs

Basil leaves and herbs may be used as optional seasoning ingredients.

3.1.22 Flavors

Natural or artifical flavors approved for food use may be used.

3.1.23 Seafood

Crab claw meat, haddock, codfish and scallops may be used. They shall be refrigerated or frozen prior to use.

3.2.24 Disodium Inosinate and Disodium Guanylate

Disodium inosinate and disodium guanylate shall be food grade.

3.2.25 Water

Water used as an ingredient, shall be from an approved source.

3.2 Processing

Ingredients selected for the particular type of soup shall be mixed together and heated to a temperature of 84.8 - 97.1°C. The mixture shall be transferred to a can (5.1.1) at a temperature of 87.8 - 97.1°C and the can is sealed.

3.2.2 Retorting

The canned products are placed in a retort and subjected to a temperature of 121°C for 50-55 minutes.

3.2.3 Labeling

The product shall be cooled and labeled. All ingredients shall be noted on the label.

3.3 Shipment

The product shall be packaged according to 5.1.2 and sent to the Manned Spacecraft Center, Houston, Texas for further processing. Shipping

instructions are contained in paragraph 5.2. Receiving inspection shall be in accordance with 6.0.

3.4 Freezing

The contents of cans for a particular type of soup shall be placed in freeze-drying trays and frozen at - 10°C.

3.5 Freeze Dehydration

The product shall be freeze dehydrated. The platen temperature shall be 52°C. After drying, the vacuum shall be broken with nitrogen and the product shall be packaged immediately.

3.6 Finished Product

3.6.1 Physical Requirements:

The finished product shall be free of any foreign material and there shall be no evidence of incomplete rehydration, such as soggy areas. The moisture content of the finished product shall not exceed 3.0 $\pm$ 1 percent. The finished product shall be rehydrated with hot water (>57.C) and there shall be no lumps, off-flavors or odors.

3.6.2 Microbiological Requirements

The microbiological composition of the dry product shall comply with Addendum No. 1E, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

3.7 Deliveries

Except for freezing, freeze-dehydration and final packaging, all other processes of preparation, heating, canning and labeling shall be performed only in an establishment which is regularly inspected by the U. S. Department of Agriculture.

3.8 All deliveries shall conform in every respect to the provision of the Federal Food, Drug, and Cosmetic Act and Regulations Promulgated Thereunder.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection

4.1 Unless otherwise specified, the contractor is responsible for the performance of inspection requirements specified herein. A certificate of compliance, processing records, and laboratory reports shall accompany each shipment. For purposes of Verification, the National Aeronautics and Space Administration reserves the right to monitor or perform any of the inspection, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt, or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects,

dirt, or foreign odor or flavor shall be cause for rejection of the entire lot. Non-compliance of the microbiological, the moisture or any of the finished product requirements, shall also be cause for lot rejection.

4.4 Sampling Procedure and Acceptance Criteria for Testing of the Finished Product

Procedures for microbiological and analytical examinations shall be in accordance with 4.5. The sample size shall be 10 percent of the lot. The lot shall be rejected if one or more of the test results indicate nonconformance to test requirements.

4.5 Tests

4.5.1 Moisture

Analysis for moisture shall be made in accordance with American Dry Milk Industry", Bulletin 916 or any other approved method.

4.5.2 Microbiological

The finished product shall be tested for the microbiological requirements in accordance with Addendum No. 1E, Microbiological Requirements for Space Food Prototypes, Space Food Prototype Production Guide, U. S. Army Natick Laboratories, Natick, Massachusetts.

5.0 Preparation for Delivery

5.1 Packaging

5.1.1 Primary Container

The primary container shall be a sanitary style tinplate steel can. The interior of the can shall be coated with an enamel which is approved for food use by the Food and Drug Administration. The

enamel interior coating shall be one which National Canners standard consider applicable for a food item in the pH range of the product.

5.1.2 Packing for Shipment

The shipping container shall be a corrugated container which meets or exceeds all provisions of the Uniform Freight Classification and the Motor Freight Classification. Wooden containers may be used. The contents shall be indicated on the shipping container, or invoice attached thereto.

5.2 Shipping Instructions

The finished product shall be shipped to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

5.3 Contractor Certification

Each shipment shall be accom panied by the Contractor's Certificate of Compliance that indicates the requirements of this document have been complied with.

6.0 Destination Inspection

Each shipping container shall be inspected at destination by an authorized representative of the government. The inspection shall include examination of the following:

a) Verify presence of Contractor's Certificate of Compliance

b) Verify that the following information is included with the shipment.

1) Product type

2) Date of production

3) Place of production

4) Production Lot number

5) Number of items in the shipment

PRODUCTION GUIDE - CHOCOLATE FLAVORED SPACE FOOD BAR

PRODUCTION GUIDE

CHOCOLATE FLAVORED SPACE FOOD BAR

1.0 SCOPE

1.1 This document describes the requirements for the production, packaging and shipment of chocolate flavored space bars for aerospace feeding systems.

1.2 Classification

1.2.1 The products shall be of the types listed below:

Type I - Chocolate Flavored Space Food Bars

2.0 APPLICABLE DOCUMENTS

2.1 The following documents form a part of this specification to the extent specified herein:

U. S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

Military

MIL-STD-668 Sanitary Standards for Food Plants

3.0 REQUIREMENTS

3.1 Materials

The product shall be produced from ingredients which comply with the regulations of the Food and Drug Administration. All ingredients used shall be of edible grade, clean, sound, wholesome. They shall possess good characteristic flavor, odor and color, and shall be free from quality defects.

3.1.1 Sweeteners

Corn syrup and sucrose shall be used.

3.1.2 Vegetable Oil

Vegetable oil shall be partially hydrogenated.

3.1.3 Sodium Caseinate

Sodium caseinate shall be high quality edible sodium caseinate.

3.1.4 Cocoa and Chocolate

Cocoa and chocolate shall be alkali processed.

3.1.5 Starch

Modified food starch may be used.

3.1.6 Salt

Salt shall be edible grade sodium chloride.

3.1.7 Stabilizer

Vegetable monoglycerides may be used.

3.1.8 Citric Acid

Citric acid shall be U.S.P. grade.

3.1.9 Artificial Flavoring and Coloring

Artificial flavoring and coloring which are approved by the Food and Drug Administration may be used.

3.1.10 Vitamins and Minerals

The space food bars may be supplemented with the following food grade vitamins and minerals to provide balanced nutrition; tricalcium phosphate, magnesium oxide, ascorbic acid, ferric orthophosphate, alpha-tocopherol-acetate, Vitamin A palmitate, niacinamide, vitamin B_{12}, pyridoxine hydrochloride, potassium iodide, riboflavin, thiamine mononitrate and vitamin D_2.

3.2 Preparation

3.2.1 Processing

The ingredients shall be blended, spread in thin layers and laminated in layers to 1/4 inch thick and cut in bars 9 (nine x 1 (one) inch.

3.2.2 Flavor and Appearance

The finished product shall be free of objectionable odors and flavors.

3.3 Processing Plant

The product shall be processed in establishments meeting the sanitary requirements of MIL-STD-668.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor shall be responsible for performing the examination and tests specified in this document. Each shipment shall be accompanied by the Contractor's Certificate of Compliance indicating compliance with requirements stipulated in this document. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be the cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of the Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects, dirt or foreign odors or flavor shall be cause for rejection of the entire lot.

4.4 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance with 4.5. The sample unit for testing shall be a composite of the entire package. The sample size shall be 10 percent of the lot. A lot for a given procurement shall be one type of product. The lot shall be rejected if one or more test results indicate non-conformance to test requirements.

4.5 Microbiological Examination

Microbiological examination shall be conducted in accordance with Addendum 1E, Microbiological Requirements for Space Food Prototypes, U. S. Army Natick Laboratories, Natick, Massachusetts.

5.0 PREPARATION FOR DELIVERY

5.1 Packaging

5.1.1 Primary Package Material

The material used for the primary container shall be a laminate of paper/polyethylene/foil/surlyn. The material shall be formed into a pouch of sufficient size to contain one bar. Closure of the pouch shall be secured by heat sealing.

5.1.2 Primary Container Labeling

The primary container shall not be labeled. All identification shall be contained in documents accompanying the shipment.

5.1.3 Packing for Shipment

The shipping container shall be a corrugated container which meets or exceeds all provisions of the Uniform Freight Classification and the Motor Freight Classification. Wooden containers may be used. The contents shall be indicated on the shipping container.

5.2 Shipping Instructions

The finished product shall be shipped to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas 77058

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

5.3 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance that indicates the requirements of this document have been complied with. The microbiological records shall also accompany the shipment.

6.0 DESTINATION INSPECTION

Each shipping container shall be inspected at destination by an authorized representative of the government. The inspection shall include examination of the following:

a) Verify presence of Contractor's Certificate of Compliance.

b) Verify presence of microbiological reports and verify compliance.

PRODUCTION GUIDE

PEANUT BUTTER FLAVORED CHOCOLATE BARS

3.1.3 Protein

Wheat gluten and soy protein isolate shall be used.

3.1.4 Non-Fat Dry Milk

Non-fat dry milk shall be USDA "extra" grade.

3.1.5 Chocolate

Chocolate shall be white chocolate.

3.1.6 Peanut Butter

Good quality peanut butter shall be used.

3.1.7 Rice Krinkles

Post Frosted Rice Krinkles or equivalent shall be used.

3.1.8 Salt

Salt shall be edible grade sodium chloride. Iodized salt shall not be used.

3.1.9 Artificial Flavoring and Coloring

Artificial flavoring and coloring which are approved by the Food and Drug Administration may be used.

3.1.10 Emulsifiers and Stabilizers

Food grade emulsifiers and stabilizers which are approved by the Food and Drug Administration may be used in approved quantities.

3.1.11 Vitamins and Minerals

A vitamin mineral premix containing sucrose, sodium iron pyrophosphate, sodium ascorbate, Vitamin A palmitate, niacin, riboflavin and thiamine shall be added in sufficient quantity to provide 100 percent of the minimum daily requirement of these vitamins and iron per bar.

3.2 Preparation

3.2.1 Processing

The following ingredients shall be dry blended for 10 minutes at slow speed.

Non-fat dry milk
Corn syrup solids
Wheat gluten
Soy protein
Sucrose
Flavoring
Salt
Vitamin Mix

Vegetable oil and emulsifier shall be liquified at a maximum temperature of 54.4°C (130°F) and added to the dry blended ingredients and mixed at slow speed for 10 minutes.

Peanut butter shall be added and mixed for an additional 2 minutes. Rice Krinkles shall be added and mixed at slow speed until coated. The mixture shall be deposited in sheets of 5/8 inch thickness and allowed to solidify under refrigeration. After solidifying, the sheets shall be cut into 1 x 3 inch bars weighing 24 grams.

Exterior coating shall be prepared by liquefying white chocolate and hydrogenated vegetable oil at a maximum temperature of 37.7°C (100°F) adding flavoring, coloring, vitamin mix and mixing for 10 minutes at slow speed. The 24 gram bars shall be dipped into the exterior coating mixture and allowed to solidify under refrigeration (4.4° - 10°C). The weight of the bar shall not be less than 40 grams.

3.3 Finished Product

3.3.1 Microbiological Requirements

Results of microbiological analyses shall comply with the requirements outlined in Addendum 1E, Microbiological Requirements for Space Food Prototypes, U.S. Army Natick Laboratories, Natick, Massachusetts.

3.3.2 Flavor and Appearance

The finished product shall be free of objectionable odors and flavors.

3.4 Processing Plant

The product shall be processed in establishments meeting the sanitary requirements of MIL-STD-668.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor shall be responsible for performing the examination and tests specified in this document. Each shipment shall be accompanied by the Contractor's Certificate of Compliance indicating compliance with requirements stipulated in this document. For purposes of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be the cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of the Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects, dirt or foreign odors or flavor shall be cause of rejection of the entire lot.

4.4 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance with 4.5. The sample unit for testing shall be a composite of the entire package. The sample size shall be 10 percent of the lot. A lot for a given procurement shall be one type of product. The lot shall be rejected if one or more test results indicate non-conformance to test requirements.

4.5 Microbiological Examination

Microbiological examination shall be conducted in accordance with Addendum 1E, Microbiological Requirements for Space Food Prototypes, U.S. Army Natick Laboratories, Natick, Massachusetts.

5.0 PREPARATION FOR DELIVERY

5.1 Packaging

5.1.1 Primary Package Material

The material used for the primary container shall be a laminate of paper/polyethylene/foil/surlyn or equivalent laminated foil. The material shall be formed into a pouch of sufficient size to contain one bar. Closure of the pouch shall be secured by heat sealing.

5.1.2 Primary Container Labeling

The primary container shall not be labeled. All identification shall be contained in documents accompanying the shipment.

5.1.3 Packing for Shipment

The shipping container shall be a corrugated container which meets or exceeds all provisions of the Uniform Freight Classification and the Motor Freight Classification. Wooden containers may be used. The contents shall be indicated on the shipping container.

5.2 Shipping Instructions

The finished product shall be shipped to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas 77058

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

5.3 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance that indicates the requirements of this document have been complied with. The microbiological records shall also accompany the shipment.

6.0 DESTINATION INSPECTION

Each shipping container shall be inspected at destination by an authorized representative of the government. This inspection shall include examination of the following:

a) Verify presence of Contractor's Certificate of Compliance.

b) Verify presence of microbiological reports and verify compliance.

c) Verify number of bars.

PRODUCTION GUIDE

INSTANT GRITS PRODUCT

INSTANT GRITS PRODUCT

1.0 SCOPE

1.1 This document describes the requirements for the production, packaging and shipment of an instant grits product for aerospace feeding systems.

2.0 APPLICABLE DOCUMENTS

2.1 The following documents form a part of this specification to the extent specified herein:

Food Chemicals Codex. 1966. Publication 1406, National Academy of Sciences, National Research Council, Washington, D.C.

U.S. Department of Health, Education and Welfare
Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

Military

MIL-STD-668 Sanitary Standards for Food Plants

Addendum 1E, Microbiological Requirements for Space Food Prototypes, U.S. Army Natick Laboratories, Natick, Massachusetts.

3.0 REQUIREMENTS

3.1 Materials

The product shall be produced from ingredients which comply with the regulations of the Food and Drug Administration. All ingredients used shall be of edible grade, clean, sound, wholesome. The ingredients shall possess good characteristic flavor, odor and color, and shall be free from quality defects.

3.1.1 Degerminated White Corn Grits

Degerminated white corn grits shall be used.

3.1.2 Salt

Salt shall be edible grade sodium chloride. Iodized salt shall not be used.

3.1.3 Cellulose Gum

Cellulose Gum shall be sodium carboxymethylcellulose and comply with the specifications outlined in the Food Chemicals Codex.

3.1.4 Niacin

Niacin, which complies with the specifications outlined in the Food Chemicals Codex, shall be used.

3.1.5 Iron

The instant grits product shall be fortified by the addition of reduced iron.

3.1.6 Butylated Hydroxyanisole (BHA)

BHA shall comply with the specifications outlined in the Food Chemicals Codex. The amount of BHA used shall not exceed the limits specified under the Federal Food, Drug and Cosmetic Act.

3.1.7 Thiamine

Thiamine chloride, which complies with the specifications outlined in the Food Chemicals Codex, shall be used.

3.1.8 Riboflavin

Riboflavin, which complies with the specifications outlined in the Food Chemicals Codex, shall be used.

3.1.9 Optional Ingredients

If desired, additional salt and a high quality butter powder may be added to the finished product. This shall be performed by the Apollo Food System contractor.

3.2 Preparation

3.2.1 Processing

The degerminated white corn grits, salt and vegetable gum are blended together and cooked. After cooking, the mixture is drum dried. Niacin, iron, thiamine, riboflavin, BHA, and additional salt are added to the dehydrated product.

3.3 Finished Product

3.3.1 Microbiological Requirements

The finished product shall comply with the requirements outlined in Addendum 1E, Microbiological Requirements for Space Food Prototypes.

3.3.2 Density

Density (cup weight) shall range between 60 - 75 g.

3.3.3 Granulation

Granulation on a U.S. 10 sieve shall not exceed 10 percent.

3.4 Processing Plant

The product shall be processed in establishments meeting the sanitary requirements of MIL-STD-668.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor shall be responsible for performing the examination and tests specified in this document. Each shipment shall be accompanied by the Contractor's Certificate of Compliance indicating compliance with requirements stipulated in this document. For purposes of verification, NASA reserves the

right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity, grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be the cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of the Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects, dirt or foreign odors or flavor shall be cause for rejection of the entire lot.

4.4 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance with 4.5. The sample unit for testing shall be a composite of the entire package. The sample size shall be 10 percent of the lot. A lot for a given procurement shall be one type of product. The lot shall be rejected if one or more test results indicate non-conformance to test requirements.

4.5 Microbiological Examination

Microbiological examination shall be conducted in accordance with Addendum 1E, Microbiological Requirements for Space Food Prototypes, U.S. Army Natick Laboratories, Natick, Massachusetts.

5.0 PREPARATION FOR DELIVERY

5.1 Packaging

5.1.1 Primary Package Material

The material used for the primary container shall be a fiber box overwrapped with paper. The fiber box shall be of sufficient size to contain 454 grams of grits. The primary container shall not be punctured during handling or shipping. Contents of a punctured container shall not be used.

5.1.2 Packing for Shipment

The shipping container shall be a corrugated container which meets or exceeds all provisions of the Uniform Freight Classification and the Motor Freight Classification. Wooden containers may be used. The contents shall be indicated on the shipping container.

5.2 Shipping Instructions

The finished product shall be shipped to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas 77058

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DC-7)
Telephone: (713) 483-5056

5.3 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance that indicates the requirements of this document have been complied with. The microbiological records shall also accompany the shipment.

6.0 DESTINATION INSPECTION

Each shipping container shall be inspected at destination by an authorized representative of the government. The inspection shall include examination of the following:

a) Verify presence of Contractor's Certificate of Compliance.

b) Verify presence of microbiological reports and verify compliance.

c) Verify number of packages.

d) Verify that the primary containers have not been punctured during shipment.

PRODUCTION GUIDE FOR INSTANT TEA

INSTANT TEA

1.0 SCOPE:

1.1 This document describes the requirements for the production, packaging, and shipment of Instant Tea for aerospace feeding systems.

1.2 Classification

1.2.1 The products shall be of the types listed below:

Type I - Instant Tea

Type II- Instant Tea with Sugar

2.0 APPLICABLE DOCUMENTS

2.1 The following documents form a part of this specification to the extent specified herein:

U.S. Department of Health, Education and Welfare

Federal Food, Drug and Cosmetic Act and Regulations Promulgated Thereunder.

Military

MIL-STD-668 Minimum Sanitary Standards for Food Plants

NASA

MSC-SPEC-C8 Spacecraft Onboard Equipment Cleanliness Specification

3.0 REQUIREMENTS:

3.1 Materials

The product shall be produced from ingredients which comply with the regulations of the Food and Drug Administration. All ingredients used shall be of edible grade, clean, sound, wholesome. They shall possess good characteristic flavor, odor and color, and shall be free from quality defects.

3.1.1 Tea. Instant Tea shall be Nestles Instant Nestea or equivalent.

3.1.2 Sweetner. Sucrose shall be used for Type II.

3.2 Finished Product

3.2.1 Microbiological Requirements

The finished product shall comply with the requirements outlined in Addendum 1E, Microbiological Requirements for Space Food Prototypes.

3.3 Processing Plant

The product shall be processed in establishments meeting the sanitary requirements of MIL-STD-668.

4.0 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Unless otherwise specified, the contractor shall be responsible for performing the examination and tests specified in this document. Each shipment shall be accompanied by the

Contractor's Certificate of Compliance indicating compliance with requirements stipulated in this document. For purpose of verification, NASA reserves the right to monitor or perform any of the inspections, examinations and tests set forth in this document.

4.2 Examination of Ingredients

Examination of all ingredients specified with respect to identity grade, and official inspection mark shall be ascertained by examination of labels, invoices, grade certificates or other valid documents. Use of ingredients not conforming to the above requirements shall be the cause for rejection of the finished product made therefrom.

4.2.1 Foreign Material

Presence of foreign material, e.g., glass, wood, metal, dirt or foreign odor or flavor in the ingredients shall be cause for rejection of the entire lot.

4.3 Examination of the Finished Product

Presence of foreign material, e.g., metal, wood, glass, insects, dirt or foreign odors or flavor shall be cause for rejection of the entire lot.

4.4 Sampling Procedure and Acceptance Criteria for Testing of Finished Product

Procedures for microbiological examinations shall be in accordance with 4.5. The sample unit for testing shall be a composite of the entire package. The sample size shall be 10 percent of the lot. A lot for a given procurement shall be one type of product. The lot shall be rejected if one or more test results indicate non-conformance to test requirements.

4.5 Microbiological Examination

Microbiological examination shall be conducted in accordance with Addendum 1E, Microbiological Requirements for Space Food Prototypes, U.S. Army Natick Laboratories, Natick, Massachusetts.

5.0 PREPARATION FOR DELIVERY:

5.1 Packaging

5.1.1 Primary Package Material

The material used for the primary container shall be a glass jar. The primary container shall not be broken during handling or shipping. Contents of a broken container shall not be used.

5.1.2 Packing for Shipment

The shipping container shall be a corrugated container which meets or exceeds all provisions of the Uniform Freight Classification and the Motor Freight Classification. Wooden containers may be used. The contents shall be indicated on the shipping container.

5.2 Shipping Instructions

The finished product shall be shipped to:

Transportation Officer
Bldg. 420
NASA/Manned Spacecraft Center
Houston, Texas 77058

Mark For: Malcolm C. Smith, Jr., D.V.M.
Technical Monitor (DB3)
Telephone: (713) 483-5056

5.3 Contractor Certification

Each shipment shall be accompanied by the Contractor's Certificate of Compliance that indicates the requirements of this document have been complied with. The microbiological records shall also accompany the shipment.

6.0 DESTINATION INSPECTION:

Each shipping container shall be inspected at destination by an authorized representative of the government. The inspection shall include examination of the following:

a) Verify presence of Contractor's Certificate of Compliance.

b) Verify presence of microbiological reports and verify compliance.

c) Verify number of packages.

d) Verify that the primary containers have not been broken during shipment.